A SYNTHESIZED DEFINITION AND ANALYSIS OF COMPUTER ETHICS

A Dissertation

by

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ABSTRACT

Computing ethics is a complex area of study that is of significant importance to the computing community and global society. Such concerns as surveillance and automation underscore the need for increased ethical understanding and training in computing. However, education and research in computing ethics are difficult due to the diverse meanings of ethics. This content analysis study analyzed definitions of computer ethics, the subject matter of computer ethics, and the relationship between the definition and subject matter. The purpose of this study was to educe and present the meaning of computing ethics, resulting in a thematic definition of computing ethics for use in education and research. This analysis also provides a coherent concept of the subject matter of computing ethics in relation to the synthesized definition. This study discusses definition and subject matter themes that emerged such as interdisciplinarity, collaboration, scholars and professionals, contributions and costs, computing artifacts, global society, privacy, design and development, and use. The results of this study can assist computing ethicists with research, aid computing educators with curriculum development, and provide a theoretical frame for relating ethics to computing. This exploration demonstrates that groups within the computing community can find common ground, even on such a difficult and complex matter as ethics.

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CHAPTER 1: INTRODUCTION

> *Definitions are the conclusion of the process, and cannot be demanded at the beginning. To the person who says, "You must state precisely what you mean by your terms before you can discuss them," we must reply, "It is only by discussing them that we can find out what we mean by them."*
>
> *On the other hand, I think it possible, on occasions, to carry this refusal to give preliminary definitions too far. At least it ought to be possible to give, if not a definition, a preliminary indication, a kind of sign-post pointing in the direction of the thing we are going to investigate.* (Field, 1932, p. 89)

Problem Statement

Because of difficulties brought on by diverse meanings of ethics, the computing community needs consensus regarding ethics, but the field has thus far failed to define an ethical framework that provides sufficient direction for education and research.

Purpose Statement

The purpose of this study was to educe and present the meaning of computer ethics. This research resulted in a synthesized thematic definition and framework of ethics, which can assist computing ethicists with research, aid computing educators with curriculum development, and provide a theoretical frame for relating ethics to computing.

Context of Problem

This work sought to define and frame ethics in computing. People in the computing sphere have a conception of what ethics *is*, but consensus on the term's *meaning* is lacking. Difficulties will exist in any community, professional and academic, if the members of that community define foundational terms differently. Additional difficulties exist when terms reach across multiple disciplines and discourses. Ethics is such a term (Stahl, 2011b). The following questions exemplify difficulties: Who should teach ethics? What ethics should be taught? How should ethics be taught? And how should ethics be practiced? Such concerns as surveillance and automation underscore the need for increased ethical understanding and training in computing.

Ethics is a universal topic. Ethics is an aspect of being in the world that every individual and society must address. Thus, an expansive literature exists on personal and societal ethics. In the professional and academic arenas, ethics is an issue that every field has a responsibility to address. Therefore, organizations and institutions have generated a wealth of literature on ethics in relation to their function. The concept of *computing and ethics* was initially introduced in the mid-to-late 20th century by scholars such as Norbert Wiener (1954) and Walter Maner (1980). And scholars have been addressing computing and ethics directly since the mid-1980s beginning with James Moor (1985) and Deborah Johnson (1985). Hence, a great deal of literature exists on computer ethics from both academic and professional perspectives. The conversation has continued at the intersection of computing and education, resulting in a wandering stream of literature on ethics in computing curricula.

In sum, numerous individuals and groups have addressed ethics. Concurrently, numerous individuals and groups have defined ethics and ethical theories. The discourse, in general, has resulted in varying definitions and frames of ethics, but also in specific fields such as computing. Related to computing, varying ethics such as *computer ethics*, *cyberethics*, and *information ethics* exist, each with a plurality of interpretations. In computing and computing education, the differences in the meaning and use of *ethics* has convoluted the subject and induced sub-problems. Among the problems are the amount and type of ethics content appropriate for computing students. An equally concerning issue is that when writers discuss ethics in the literature, and specifically computer ethics, many do not define the term. Writers within a community of discourse commonly assume that the term *ethics* is understood and forego grappling with its meaning.

In the computing field, substantial discussion has transpired amongst academics and professionals about the need for ethics education. Researchers have assessed deficiencies, the community has issued calls to action, and methods for integrating the study of ethics into computing curriculum are available. Yet, calls to action remain mostly unanswered, disparate levels of ethics education exist across computing programs, and the computer ethics field is muddled. The computing community needs consensus regarding ethics, but the field has thus far failed to produce a synthesized definition of ethics that provides sufficient direction for education and research.

In 2001, James Moor proposed that, “if one is looking for a vital area of research in which to do a dissertation, consider computer ethics” (p. 89). Also, the role of ethics within the Association for Computing Machinery’s (ACM) *Computing Curriculum Series* has moved from peripheral status to a cemented core status (Greening, Kay, & Kummerfeld, 2004). And though ethics is regularly discussed within the context of computing, philosophy, and education, no study has presented a synthesized definition and framework of computing ethics. More specifically, no study has examined the ethics discourses within the sphere of computing in order to present the *meaning(s)* of ethics contained therein.

Computing and Ethics

Computer ethics is a phrase commonly used in the literature to identify the concept of *computing and ethics*. However, computer ethics may give a narrow impression, such as ethics related to the *use* of *only* a computer. The term *computing* is a more appropriate qualifier (for the moment) in the context of this study. The difficulty and advantage with computing is that its meaning changes with time, along with the discipline. Computing continues to evolve and new computing-related fields will likely emerge (Shackelford et al., 2006).

One of the early reports on computing as a discipline was published in 1989 in *Communications of the ACM* (Denning et al., 1989). In the report, two fields were recognized, both of which shared a core curriculum: computer science and computer engineering. The report explicitly stated, "The phrase *discipline of computing* is used here to embrace all of computer science and engineering" (p. 10). The discipline of computing was then defined as, "the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application. The fundamental question underlying all of computing is, 'What can be (efficiently) automated?'" (Denning et al., 1989, p. 12).

Computing has since been re-defined by ACM in the *Overview Report on Computing Curricula* (CC2005–Overview):

> In a general way, we can define computing to mean any goal-oriented activity requiring, benefiting from, or creating computers. Thus, computing includes designing and building hardware and software systems for a wide range of purposes; processing, structuring, and managing various kinds of information; doing scientific studies using computers; making computer systems behave intelligently; creating and using communications and entertainment media; finding and gathering information relevant to any particular purpose, and so on. (Shackelford et al., 2006, p. 9)

The discipline of computing has shifted from an unambiguous scientific (systematic) discipline focused on *processes* to a more ambiguous computing discipline that is *goal-oriented*.

The following domains are the computing sub-disciplines formally recognized by ACM: computer engineering (CE), computer science (CS), information systems (IS), information technology (IT), and software engineering (SWE). Peter Denning (2013) has used *computing* to refer to "the set of related fields that deal with computation" (p. 35). Denning (2013) included the fields of computer science, computational science, information science, computer engineering, and software engineering. According to Denning (2007), "computing is the study of information processes, artificial and natural" (p. 18). ACM has also stated that the list of what computing entails is "virtually endless" and has different meanings based on context, but regardless, computing should be thought of not "only as a profession but also as a discipline" because "society needs people to do computing well" (Shackelford et al., 2006, p. 9). For the purposes of this study, the *computing community* is inclusive of all scholars and practitioners whose work relates directly to the field of computing, including computing ethicists.

The *Oxford English Dictionary* (2013) has defined *ethics* as: 1) "moral principles that govern a person's or group's behavior" and 2) "the branch of knowledge that deals with moral principles." The *New Oxford American Dictionary* (2010) added another entry: "the moral correctness of specified conduct." As a discipline, the study of ethics is an area of philosophy and more specifically, moral philosophy. Ethics is also rooted in religion and culture, but philosophical ethics is primarily rationalistic, "relying on human reason" (Preston, 2007, p. 14). Philosophical ethics is layered, consisting of the practical and the theoretical. The practical has to do with behavior within a socio-cultural matrix and the moral aspect of being able to practically judge what is good behavior (a good end) and bad behavior (a bad end). The theoretical is the discursive construction of an explanatory framework of the practical.

The word *ethics* is Greek in origin, derived from *ethos* meaning custom, character, or way of life. Throughout the literature, ethics is often used interchangeably with morality. *Morality* is Latin in origin, derived from *mos* (genitive *moris*), *mores* (plural), or *moralis* (adjective), which likewise is the concept of character, codes of behavior, or custom. In modern times, morality may be used to mean *the conduct itself*, while ethics may be used to mean *the study of moral conduct (moral philosophy)* or *the rules of conduct (a particular ethic)* (Dewey & Tufts, 1906, p. 1; Preston, 2007, pp. 16-17; Titus, Smith, & Nolan, 1994, p. 20).

The modern terms *ethical* and *moral* as applied to conduct, "imply of course a far more complex and advanced type of life than the old words 'ethos' and 'mores,'…but the terms have a distinct value if they suggest the way in which the moral life had its beginning" (Dewey & Tufts, 1906, p. 2). A moral philosophy

> characteristically presupposes a sociology. For every moral philosophy offers explicitly or implicitly at least a partial conceptual analysis of an agent to his or her reasons, motives, intentions and actions, and in so doing generally presupposes some claim that these concepts are embodied or at least can be in the real social world. (MacIntyre, 2007, p. 23)

The ethical is intimately bound to the social and cultural. Therefore, ethics is a prominent subject throughout history and in written works.

Ethics has been defined a countless number of times through history and the definition changes based on the context, specifically the discipline and the discourse. The following four general definitions from the field of philosophy illustrate definition diversity and provide a baseline for a study of ethics:

1. G. E. Moore (1993), after suggesting that verbal questions should be left to writers of dictionaries and that philosophy has no concern with such questions, defined ethics as, “the general inquiry into what is good” (p. 54).
2. “Moral philosophy…consists primarily in reflection on moral experience and criticism of moral assumption” (Field, 1932, p. 86).
3. Preston (2007) stated, “we may regard ethics as *the study which arises from the human capacity to choose among values*” (p. 7).
4. “The field of ethics (or moral philosophy) involves systematizing, defending, and recommending concepts of right and wrong behavior” (Fieser, 2009).

For further context, what follows is a brief summary of the evolution of computer ethics as a topic of inquiry. In the mid-to-late 20th century, the topics of computing and ethics converged. Norbert Wiener laid the foundation for what would eventually be computer ethics with the publication of the book *The Human Use of Human Beings* in 1950. More than two decades later, Walter Maner coined the term *computer ethics* while developing materials for a course on the subject in the late 1970s. In a seminal article in 1985, James Moor posed the question, “What is Computer Ethics?” in the journal *Metaphilosophy*, while concurrently Deborah Johnson published the first major textbook on the topic called *Computer Ethics*.

In the early 1990s, Donald Gotterbarn made an effort to reposition computer ethics as a professional ethics related the practice of computing professionals. Krystyna Górniak-Kocikowska predicted in a 1995 ETHICOMP presentation that, due to the ubiquity of computing technology, computer ethics would become a global ethic. Then in 1999 at the ETHICOMP conference, Johnson predicted that computer ethics would disappear in the future as computing technology matured into a part of ordinary human action. Post-2000, Herman Tavani has widened the concept of computer ethics to be *cyberethics* with the publication of the book *Ethics and Technology* and other works. Concurrently, Luciano Floridi has advocated that the academic community recognize the concept of a theoretical foundation for computer ethics designated as *information ethics*.

Purpose of Study

The purpose of this study was to educe and present the meaning of ethics in the computing community. To educe is to bring out, develop, or infer from data something that is latent or potential. This research resulted in a definition and framework of ethics, which can assist computing ethicists with research, aid computing educators with curriculum development, and provide a theoretical frame for relating ethics to computing. The far-reaching goals are to a) bring moral frameworks into focus, b) increase the number of students and professionals applying ethical principles, c) encourage educators to vitalize the necessity of technologists to act on ethical awareness and issues, and d) encourage thinking in relation to computing and technology.

Research Questions

This research explored the following research questions:

1. How does the computing community define *computer ethics* and synonymous terms?
2. What is the subject matter of journals with a computing ethics scope?
3. How does the definition derived from Question 1 relate to the subject matter derived from Question 2?

Methodology Preview

A qualitative approach guided this study, though the research method produced mixed data. A combination of qualitative and quantitative data allows for "both inductive and deductive reasoning, build[s] a broader picture by adding depth and insights into 'numbers' through inclusion of dialogue" and "add[s] precision to 'words' through inclusion of numbers…" (O'Leary, 2010, p. 128). Content analysis was the qualitative method employed in conducting this research study. Content analysis is a method for interpreting meaning in discourse (O'Leary, 2010). Also, content analysis is particularly useful for classifying information in textual artifacts (Nardi, 2005). The data collected allowed for a duality of thematic and statistical analysis. This dissertation presents an analysis of discourse and describes a synthesis concerning definitions of computer ethics, the subject matter of ethics in computing, and the relationship between the definition and subject matter.

The research plan was as follows. The researcher collected and analyzed two artifact types:

1. Definitions taken from primary and secondary texts (i.e., articles, books) related to computing ethics.
2. Journal articles published in journals with an ethics and computing scope:
    a. ACM Computers and Society (ISSN: 0095-2737);
    b. IEEE Technology and Society Magazine (ISSN: 0278-0097);
    c. Ethics and Information Technology (ISSN: 1388-1957); and the
    d. Journal of Information, Communication, and Ethics in Society (ISSN: 1477-996X).

Definition data collection and analysis provided an answer to Research Question 1. Journal article data collection and analysis provided an answer to Research Question 2. The findings enabled a comparative analysis to answer Research Question 3.

Both artifact types underwent two methods of analysis. The first method was a frequency analysis, which gave a purely statistical perspective of the discourse. The second method was a deeper contextual analysis that entailed thematic coding of the artifacts. Primary coding methods included attribute coding, in vivo coding, and descriptive coding. The research process enabled analysis such as mapping codes, distilling themes, identifying dominant terms, comparing definitions, comparing journal content, comparing artifact content, and educing the meaning of ethics in computing.

Significance of Study

The significance of this study is entwined with the significance of computing technology. Computing technology has the power to transform human activity and social institutions. Moor hypothesized in 1985 that computing technology, due to its "logical malleability," would be revolutionary (Moor, 1985, p. 269). Indeed, computing technology has proven to be revolutionary and as the revolution continues to transform the world, computing ethics remains fundamentally important.

This research study provides the computing community with developmental benefits. First, this research promotes new and continuing discussion regarding computing ethics research. Second, this study provides computing educators with an essential component that facilitates ethics education in computing programs. By resolving the definition quandary, this research establishes a foundation for integrating the study of ethics into computing curricula, thereby addressing deficiencies and disparate levels of ethics education. Third, this research assists in supplying the professional computing community with ethically trained personnel, thereby contributing to answering the community call. Fourth, this research assists in supplying society with citizens that are ethically aware, thereby helping society confront the vulnerabilities associated with computing technology.

Dissertation Overview

Beyond the Chapter 1 introduction, this dissertation contains four additional chapters. Chapter 2 contains a review of the literature, which discusses definition in ethics, ethics categories, ethical theories and classifications, ethics and computing, ethics in computing education, computing codes of ethics, ethics in related disciplines, and related studies. Chapter 3 discusses the research methodology chosen for this study and the three research questions. Chapter 4 presents the data analysis and discussion of the findings. Chapter 5 offers reflexive, reflective, and concluding remarks.

CHAPTER 2: LITERATURE REVIEW

> *Ethical responsibility…involves more than leading a decent, honest, truthful life, as important as such lives certainly remain. And it involves something much more than making wise choices when such choices suddenly, unexpectedly present themselves. Our moral obligations must…include a willingness to engage others in the difficult work of defining what the crucial choices are that confront technological society and how intelligently to confront them.* (Winner, 1990, p. 62)

Literature Overview

Computing is a complex and dynamic field (Shackelford et al., 2006). Moral life is extremely complex since morality is dynamic and progressive (Dewey & Tufts, 1906). Thus, computing ethics is a complex research field. Research in the field continues to grow and evolve as problems related to information and communication technology (ICT) continue to intensify. This chapter presents relevant literature on definition in ethics, ethics categories, ethical theories and classifications, ethics and computing (computer ethics), ethics in computing education, computing codes of ethics, ethics in related disciplines, and related studies.

A challenge related to the expansion of the computing discipline and growth of its subfields lies in the literature itself. The education literature of the traditional computing fields of CS and CE has evolved separately from the literature of the business-related computing fields of IT and IS. Meanwhile SWE has become a field in its own right, with an accompanying body of knowledge. Subsequently, each computing field has an independent ethics literature component, though overlap does exist. The situation is similar with the related major fields of computing, engineering, and business.

Furthermore, a separation exists in the literature of computer ethics as viewed by practitioners (scientists) versus philosophers. An overriding question emerges from study in computing ethics: Does ethics frame computing, or does computing frame ethics? The question can be asked another way: As a topic of inquiry, is computer ethics a topic within ethics, or is computer ethics a topic within computing? The answer to the question largely depends on the discipline (community) from which a discussion originates. A philosopher views computer ethics with a moral philosophy lens, while a computer (computing practitioner) views computer ethics with a computing lens.

Few writers make this distinction when writing on the topic of computer ethics, which may cause confusion. Philosophers have a different conception of computer ethics as an academic field, in scope and methodology, from that of computing scientists and social scientists (Tavani, 2001, p. 97, footnote 2). Part of the issue is due to the fact that ICT is present everywhere, has an impact on everyone's life, and is not being dealt with by any field exclusively (Górniak-Kocikowska, 2007). As a result, the issues in computer ethics are so varied that the concept of computer ethics becomes fuzzy (Gotterbarn, 1991). Tavani (2012) Chapter 1, section 1.4, is a source that carefully discussed *cyberethics* from three perspectives: professional, philosophical, and sociological/descriptive (pp. 14-24).

Scholars generally agree that collaboration is essential for the future of ethics in relation to computing. Representatives from varied cultures must work together to meet the challenges. "Members of the scientific community must bring a greater technical understanding…those from the humanities must bring a basis on which to make moral judgments" (Edgar, 2002, p. 3). Computer ethics education and research requires a closer liaison and a multi-disciplinary approach: between "computer scientists, social scientists and philosophers" (Brey, 2000b, p.

128); "theoreticians and practitioners" (Weckert, 2001, p. 96); "ethicists, scientists, social scientists, and technologists" (Moor, 2005, p. 118); "engineers, ethicists, and STS [Science, Technology, and Society] scholars and teachers" (Herkert, 2005, p. 382); and "engineering ethicists and computing ethicists" (O'Connell & Herkert, 2004).

Professional and scholarly societies, such as the Association for Practical and Professional Ethics, are "in a position to conduct joint conferences on social and ethical issues of relevance" for fields related to computing (Herkert, 2005, p. 378). However, the research literatures remain largely disconnected. As noted by Weckert (2001),

> in computer ethics it is not common to find papers which examine, say, X's argument on Internet content regulation, and then build on that examination. Most papers refer little to other works on the same topic, and examine them even less. (p. 96)

In education, a fundamental change is needed:

> a schooling of engineers rooted in a more 'liberal' tradition, engaging engineering knowledge and know-how, still with science and technology at the core but in a setting that allows students to challenge the 'givens', even the suitability of ends…This will require a new faculty, a mixed faculty. (Bucciarelli, 2008, p. 147)

Cooperation and continued serious attention to such challenges, by the stakeholders, will improve computer ethics education and research.

Debates over the level of involvement and training necessary for addressing ethics and computing are familiar in the literature. Marturano (2012) captured the philosopher's perspective:

> I agree…about collaboration among peers in ethical deliberations…The main problem with such a requirement is that ethicist is a voice seldom understood and many social

> scientists and scientists too often are wearing an ethical vest without any specific, real ethical training. Ethical subtleties are not accessible to those who have no real ethical education; they will underestimate ethical dilemmas or reduce them…at a mere cost-benefits problem for societies. (Marturano, 2012, p. 128)

Deborah Johnson's 1994 article entitled "Who Should Teach Computer Ethics and Computers & Society," along with the accompanying responses, captured the scientist's perspective. Walter Maner argued that everyone develops ethical expertise through living, and ethical training will never make anyone an expert (p. 10). Other respondents argued that scientists are in a better position to be trained in ethical theories and strategies, and computer scientists better understand the implications of technical concepts (Johnson, 1994). This research study attempted to blend the disjointed literatures and present a coherent interdisciplinary concept of ethics and computing.

Definition in Ethics

The primary deliverable of this research is a definition of computer ethics. Constructing a definition is typically a lexicographic pursuit. A definition provides the boundaries for investigating a topic. A definition may also be considered an assortment of components or principles that, when related, *define*. For example, in the case of judgments, "to give a scientific account of judgments about conduct, means to find the principles which are the basis of [the] judgments" (Dewey & Tufts, 1906, p. 2). According to G.E. Moore, "the most important sense of 'definition' is that in which a definition states what are the parts which invariably compose a certain whole" (Moore, 1993, p. 61). The computing community has not made previous methodological attempts to define ethics in computing, nor to define ethics in the most important sense.

Defining a word or phrase typically means expressing a word's meaning with other words. But similar to Moore's statement with regard to defining *good*, this study did not only seek such a definition. This study also sought "that object or idea, which I hold, rightly or wrongly, that the word is generally used to stand for. What I want to discover is the nature of that object or idea, and about this I am extremely anxious to arrive at an agreement" (Moore, 1993, p. 58). Moore viewed *good* as a simple notion, which resulted in Moore declaring good as indefinable, but *the* good (that which is good) as definable (p. 61).

> Definitions which describe the real nature of the object or notion denoted by a word, and which do not merely tell us what the word is used to mean, are only possible when the object or notion in question is something complex…And so it is with all objects, not previously known, which we are able to define: they are all complex; all composed of parts, which may themselves, in the first instance, be capable of similar definition, but which must in the end be reducible to simplest parts, which can no longer be defined. (Moore, 1993, p. 59)

Ethics, and more specifically computer ethics, is a complex notion and therefore is definable.

The definition of *ethics* can be framed in the same way Moore (1993) framed the definition of *horse*. The statement, as *Webster* says, 'the definition of ethics is "the discipline dealing with what is good and bad and with moral duty and obligation; a set of moral principles; the principles of conduct governing an individual or a group,"' can mean three different things. (1) The definition may merely mean the arbitrary verbal definition as stated by Webster: ethics is a set of moral principles. (2) The definition may mean, as Webster ought to mean, 'when most English people say "ethics" they mean ethics is a set of moral principles,' which is the verbal definition proper: how people use a word. (3) But the definition may mean something much more important. The definition may mean that a certain object, which everyone knows, is composed in a certain manner: the object has a network of parts with relations to one another (adapted from Moore, 1993, p. 60). In all three senses *computer ethics* is definable, but the latter sense is most important.

At a specifically unknown time between 1929 and 1930, a couple decades after the publication of Moore's *Principa Ethica*, the philosopher Ludwig Wittgenstein (1965) presented a view on ethics via a lecture. Wittgenstein explained two senses in which expressions are used: the relative and the absolute. Wittgenstein argued that all human expressions are natural (factual), and thus relative. Wittgenstein insisted that ethics in the absolute sense, being supernatural, is beyond language.

> My whole tendency and I believe the tendency of all men who ever tried to write or talk Ethics or Religion was to run against the boundaries of language. This running against the walls of our cage is perfectly, absolutely hopeless. Ethics so far as it springs from the desire to say something about the ultimate meaning of life, the absolute good, the absolute value, can be no science. What it says does not add to our knowledge in any sense. But it is a document of a tendency in the human mind which I personally cannot help respecting deeply and I would not for my life ridicule it. (Wittgenstein, 1965, pp. 11-12)

Still, Wittgenstein offered an approach to make clear the subject matter of ethics.

Beginning with Moore's definition of ethics, Wittgenstein provided synonymous definitions, maintaining a focus on language. Similar to Francis Galton's method of composite photography, Wittgenstein enumerated a collection of synonymous expressions, so that if a person was to look through the "row of synonyms," the person would be able to see the characteristic features the synonyms share, which are the characteristic features of ethics (Wittgenstein, 1965, pp. 4-5).

G. C. Field (1932) also wrote about the place of definition in ethics. As with Moore, most of the discussion was for the purpose of arriving at a definition of the good, and not ethics per se. Field (1932) stated that definition is not “one of the major questions a moral philosopher has to face. But it is of some interest, and of enough difficulty to lead to certain clear differences of opinion” (p. 79). What Field elaborated on considerably in the lecture was the *process* of definition.

The process of definition can take several forms. Euclidean geometry provides one example. A person may start with a definition of a figure, and from the definition deduces other properties and the figure’s relationships to other figures. In such a case, the definition is a starting point. Also in such a case, a prior *idea* of the thing to be defined exists (perhaps only in the mind), thus the term has meaning before the particular feature(s), taken to be the definition, are known. Biology provides a different process example when determining the classification of genus and species. In a biological case, the definition is the conclusion of the process and nothing follows from the definition. No matter the process, the goal is to avoid the extremes of arbitrary definition and the absolute position that one and only one definition for a general term is possible (Field, 1932).

Field’s (1932) observations related to the preceding analogies were concerned with definition *in* ethics, not the definition *of* ethics. But some of the ideas are related. (1) Computer ethics cannot possibly start “with any definitions which will be generally and immediately accepted and recognizably applicable to the objects of our study” (p. 84). (2) “The starting point for ethics is always the moral judgments of mankind and what is implied in them, and we can never get away from these as our main source of knowledge" (p. 85). (3) "The technique of this process of clarifying the vague ideas with which we start would be an interesting subject of study" (p. 85). (4) Arriving at definitions is not the whole of ethics, but "it is certainly the most important and the most difficult part. So the place of definition in ethics…is a continuous and progressive process" (pp. 88-89). (5) Definitions, or preliminary indications, should not be restricted in their modification throughout a study. The study of a subject should produce modifications and developments or else the discussion would be an unfruitful discussion (pp. 89-90). (6) What is *meant* by [*computer ethics*] is the vague idea with which a person starts.

> But this only sets the problem. What we are trying to find is the nature of the facts that we must suppose to exist in order to account for the way in which we think about these matters. And anything that we can say about them may equally be taken as a part of their definition, in the only sense in which definition is possible in ethics at all. (Field, 1932, p. 94)

The propositions posited by Field provide guiding principles for defining computing ethics.

John Dewey and James Tufts (1906) spoke about the definition *of* ethics. Dewey and Tufts (1906) believed that a definition is a consequence of a process, a position also held by Field (1932). And unlike Wittgenstein (1965), Dewey and Tufts considered ethics to be a science.

> The place for an accurate definition of a subject is at the end of an inquiry rather than at the beginning, but a brief definition will serve to mark out the field. Ethics is the science that deals with conduct, in so far as this is considered as right or wrong, good or bad. A single term for conduct so considered is "moral conduct," or the "moral life." Another way of stating the same thing is to say that Ethics aims to give a systematic account of

> our judgments about conduct, in so far as these estimate it from the standpoint of right or wrong, good or bad. (Dewey & Tufts, 1906, p. 1)

Further, Dewey and Tufts (1906) argued that conduct, or the moral life, has two aspects: inward and outward. Inward meaning a life of purpose, which implies thought, feeling, ideals, motives, valuation, and choice. The life of purpose can be studied by psychological methods. Outward implies relations to nature, and especially to human society. The outward relations can be studied by the life sciences and social sciences such as biology, sociology, economics, politics, and law. However, ethics is not merely the sum of the mentioned sciences, ethics is also *the relations* (Dewey & Tufts, 1906).

The two aspects of life and conduct (inward and outward) create a specific problem in ethics. Ethics must relate life and conduct, meaning ethics must also relate the various sciences (Dewey & Tufts, 1906).

> [Ethics] has to study the inner process *as determined by the outer conditions or as changing these outer conditions*, and the outward behavior or institution *as determined by the inner purpose, or as affecting the inner life*. To study choice and purpose is psychology; to study choice as affected by the rights of others and to judge it as right or wrong by this standard is ethics. Or again, to study a corporation may be economics, or sociology, or law; to study its activities as resulting from the purposes of persons or as affecting the welfare of persons, and to judge its acts as good or bad from such a point of view, is ethics. (Dewey & Tufts, 1906, p. 3)

Whether or not a study in ethics is scientific, such a study is interdisciplinary. Computer ethics relates various areas of life and conduct, and perhaps *is* the relationships between the areas.

William Frankena (1963), who stated that moral philosophy (ethics) "begins when people find their code of prevailing moral rules unsatisfactory," also discussed definition in ethics (p. 12). In the book *Ethics* "Chapter Six: Meaning and Justification," Frankena (1963) presented thoughts about definition in ethics and definist theories. Like Moore and Field, Frankena (1963) dealt with definition *within* ethics, not *of* ethics, and warned that definitions in ethics can "turn out to be disguised ethical principles that cannot themselves be deduced logically from the nature of things" (p. 84). Still, Frankena stated that normative discourse (see "Ethics Categories") is

> a language in which we may express our sentiments – approvals, disapprovals, evaluations, recommendations, advice, instructions, prescriptions – and put them out into the public arena for rational scrutiny and discussion, claiming that they will hold up under such scrutiny and discussion and that all our audience will concur with us if they will also choose the same common point of view. (Frankena, 1963, p. 92)

This research study presents the discourse of computer ethics, synthesizes the meaning of computer ethics, and submits the results to the public arena, all the while optimistic that a common point of view exists.

Ethics Categories

The field of philosophy offers three generally recognized categories of ethics. Meta-ethics, sometimes called critical ethics, is "centered on the analysis and meaning of the terms and language used in ethical discourse and the kind of reasoning used to justify ethical statements" (Titus et al., 1994, p. 120). Meta-ethics involves looking at "the nature of ethics and the grounds for pursuing it" (Preston, 2007, p. 17). Study in meta-ethics is to study the meaning of moral language and the meta-physics of morality. A question typical of meta-ethics is "What is *right*?"

Another category is normative ethics. The normative category, sometimes called prescriptive ethics, “is concerned with the principles by which we *ought* to live” (Titus et al., 1994, p. 120). Normative ethics provides theories that aim to guide conduct, and frames by which issues can be considered (Preston, 2007). Study in normative ethics is to study frameworks of decisions and standards of action. A question typical of normative ethics is “What *ought* to be right?”

Applied ethics is the third category. Sometimes called descriptive ethics, applied ethics considers actual conduct of individuals and groups (Titus et al., 1994). The applied area draws from the field of philosophy, but is rooted in numerous interconnected fields in the humanities, social sciences, and life sciences (Preston, 2007). Study in applied ethics is to study moral beliefs of individuals and groups. A question typical of applied ethics is “What is believed to be right?” Meaning, given a particular issue, and from a certain moral standpoint “What is the right course of action?”

Ethical Theories and Classifications

Most work in ethics is within the categories of normative and applied ethics, including work related to computer ethics. Both categories can be further divided into theories and classifications. Ethical theories are basic approaches to or standards of ethical justification. Classifications can be thought of as domains or methodologies for the study of ethics. Two major diverging viewpoints in ethical theory are consequentialism (teleology) and non-consequentialism (deontology) (Frankena, 1963; Preston, 2007). This section presents both viewpoints and the prominent theories that subscribe to each viewpoint. This section also presents some prominent classifications of normative and applied ethics related to computer ethics.

Consequentialism is one of the major viewpoints in ethical theory. The technical term for the consequentialist approach is *teleology*, based on the Greek word *telos*, meaning *goal* or *end* (Preston, 2007). Teleological theories suggest that the end justifies the means: A teleological theory judges “conduct as right or wrong in relationship to some end or goal considered good” (Titus et al., 1994). Utilitarianism is the most prominent consequentialist theory. John Stuart Mill (2008) described utilitarianism as the “creed which accepts as the foundation of morals, Utility, or the Greatest Happiness Principle, holds that actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness” (p. 15). Other prominent teleological theories are state consequentialism, rule consequentialism, ethical egoism, ethical altruism, and situation ethics.

Non-consequentialism is another major viewpoint in ethical theory. The technical term for the non-consequentialist approach is *deontology*, based on the Greek word *deon*, meaning *duty* (Preston, 2007; Titus et al., 1994). Deontological theories are theories “in which a sense of duty or principle prescribes the ethical decision” (Preston, 2007, p. 36). Deontological theories primarily emphasize duty and obligation, and are inclusive of divine law, moral law, natural law, and good will (motive) (Titus et al., 1994). Non-consequentialist ethics “enjoin us to do the right thing simply because it is the right thing” (Preston, 2007, p. 40).

Kantianism, named after Immanuel Kant and sometimes called formalism, is the most prominent deontological theory. Kant’s theory, based on rationality and logic, suggests that moral principles (laws) are recognized directly as true and binding (Titus et al., 1994). Kant formulated the *Categorical Imperative*, which is similar to the biblical golden rule. Simply put, Kant argued that rational beings should only act according to rules which they would accept as universal law (Preston, 2007; Titus et al., 1994). Kant also espoused that persons should always be an end, and never a means (Titus et al., 1994). Other prominent deontological theories are moral absolutism, divine command theory, contractualism, and agent-centered or patient-centered theories.

Beyond consequentialism and non-consequentialism, other major viewpoints are provided within the fields of social and political philosophy. Among the viewpoints are justice theory, feminist (ethic of care) theory, and virtue ethics (Preston, 2007). Justice theory, championed by John Rawls, is primarily concerned with the rights, rules, and just distribution of resources in a society. Feminist theory is primarily concerned with differences in male and female approaches to ethics. Virtue ethics (eudaimonism) is a popular field with its roots in the works of Plato and Aristotle. Virtue ethics is primarily concerned with what a person *is* (who we *are*) versus what a person *does*. The question in virtue ethics is not "What ought we to *do*?," but "Who ought we *become*?" (Preston, 2007, p. 49). Based on reason, a person fosters living well, such that good behavior emanates instinctively from the person.

A further decomposition of ethical theories is beyond the scope of this study, however the ethical theories offered require a few more important observations. First, the theories previously discussed are normative in nature. The field of applied ethics utilizes normative theories for decision-making. Much of applied ethics is approached from utilitarianism, deontological ethics, or virtue ethics. Also, a latent scale of absolutism-relativism underlies the normative theories. Absolutism suggests that in a moral situation a norm prevails, along with an absolute authority for the norm's support. Relativism suggests that no norm prevails, and morality is a matter of opinion or preference. Between the two extremes lies situation ethics, which does acknowledge a norm, but regards each moral situation as unique, thus calling for varied applications of the norm (Titus et al., 1994).

Another approach existing between absolutism and relativism is the method of casuistry. Casuistry starts with details of a case and then works out what theories or considerations ought to be considered to determine a response to the case (Jonsen & Toulmin, 1988). Casuistry is very practical in nature, and thus has found use in areas of applied ethics. Lastly, other ethical theories exist beyond those in Western culture, such as theories rooted in Eastern traditions.

Ethics classification is a way of taxonomizing topical areas of or approaches to ethics study. Commonly used classifications include professional ethics, business ethics, engineering ethics, environmental ethics, medical ethics, legal ethics, and so on. In some writings, a particular classification will be sub-classified. For example, computer ethics could be viewed as an area of applied ethics, and also as a sub-category of professional ethics, as is the case in (Gotterbarn, 1991). Another aspect of such classification is the addition of a normative approach to a field of ethics. For example, ethics topics such as information systems (IS) or computing can be approached as discourse IS ethics (Mingers & Walsham, 2010), or disclosive computer ethics (Brey, 2000a). Subsequent portions of this chapter present some classifications in further detail.

Ethics and Computing

Background and Debates

In the mid-20th century, the topics of computing and ethics converged. Norbert Wiener laid the foundation for computer ethics with the publication of the book *The Human Use of Human Beings* in 1950. Since 1950, computing ethics has developed into a rich research field. Writers have facilitated the evolution of computer ethics via a variety of avenues. Notably, the field gained traction in academia with the publication of James Moor's "What is Computer Ethics?" in 1985. Moor (1985) defined computer ethics, and argued for the special status of computer ethics as a field of study.

> Computer ethics is not a fixed set of rules which one shellacs and hangs on the wall. Nor is computer ethics the rote application of ethical principles to a value-free technology. Computer ethics requires us to think anew about the nature of computer technology and our values. (Moor, 1985, pp. 267-268)

Computer ethicists have largely held to Moor's definition and arguments for the study of computer ethics.

According to Moor (1985), computers are revolutionary because of their "*logical malleability*," which led Moor to predict the computer revolution, and the importance of computer ethics. Additionally, Moor discussed the introduction and permeation stages of the computer revolution. The concluding argument of (Moor, 1985) was that the invisibility factor, composed of a) invisible abuse, b) invisible programming values, and c) invisible complex calculation, makes humans vulnerable (Moor, 1985). The challenge for computer ethics is to formulate responses to policy and concept vacuums (Moor, 1985).

Terrell Bynum has written extensively on the foundation and history of computer ethics. To begin, Bynum (2000) used Wiener's ideas to present the major foundational components of computer ethics. Though Wiener's ideas are traceable to Aristotle, Bynum (2000) claimed Wiener's ethical approach was different, as Wiener adopted three "great principles of justice" rather than virtues and vices. The principles are freedom, equality, and benevolence. An important point raised by Bynum (2000) via Wiener is that a social community must provide a context based on the principles if humans are to realize their full potential as information-processing agents.

Bynum (2000) also argued that everyone coping with ICT should be engaged in computer ethics, and then provided a model of how to *do computer ethics* based on four guidelines and a three step process. The guidelines are as follows: human purpose, principles of justice, unambiguity, and precedent/tradition. The following steps are the process: 1) "Identify an ethical question or case regarding the integration of ICT into society;" 2) "Clarify any ambiguous concepts or rules that may apply to the case in question;" 3) "Apply existing principles, laws, rules, policies and practices which govern human behavior in the given society. Use precedent and traditional interpretation in such a way as to *assimilate the new case or policy into the existing set of social policies and practices*" (Bynum, 2000, p. 12).

The Stanford Encyclopedia of Philosophy contains entries detailing the history and development of computer ethics as a field, which were also written by Bynum (2001a, 2011). The entries provide definitions and terms related to ICT and ethics. The 2001 entry is also useful for comparison to the more recent 2011 entry, as definitions and terminology have changed over time. For example, the entry title is no longer just "Computer Ethics," but was renamed "Computer and Information Ethics." Around the same time the Winter 2001 encyclopedia entry was published, Bynum (2001b) had another paper published detailing the history of computer ethics called, "Computer Ethics: Its Birth and its Future." The focus of (Bynum, 2001b) was a discussion of the hypotheses proposed by Krystyna Górniak-Kocikowska (1996) and Deborah Johnson (1999) about the future of computer ethics as an academic field.

Górniak-Kocikowska (1996) argued two major points. First, the computer revolution is more comparable to the printing press revolution (than the industrial revolution), which resulted in new ethical theories. Second, due to the global nature of computer technology, people should view computer ethics as a global ethic: Eventually, computer ethics will fade into a global ethic. Górniak-Kocikowska (1996) suggested that Moor and other writers' definitions of ethics were too narrow, and that the field's importance was underestimated. Górniak-Kocikowska did not provide a definition of computer ethics, but argued the definition “ought to be widened and the field…should be regarded as a great deal more than yet another example of professional ethics” (Górniak-Kocikowska, 1996, p. 179).

Johnson’s argument was that computer technology would become “the presumed background condition” (Johnson, 1999). As computer technology matured and increasingly became part of ordinary human action, the ethical and social issues raised by computer technology would simply become ethical and social issues (Johnson, 1999). Antonio Marturano (2002) critiqued Johnson’s point of view on the disappearance of computer ethics as a discipline. Marturano (2002) argued that computer ethics would not entirely disappear, even if computer ethics were to cease to be considered a discipline. Marturano (2002) compared Johnson’s remarks to the remarks of earlier writers Norbert Wiener and Bertrand Russell. Marturano (2002) concluded that applied ethics and its forms (including computer ethics) will not die, but in the future talking about computer ethics as a separate discipline may make no sense. Furthermore, computer ethics will not simply become “ordinary ethics” as Johnson (1999) had suggested. Rather, in a more limited sense, computer ethics may be absorbed into a more general field of the Ethics (and philosophy) of Technology (Marturano, 2002, 2012).

The debate between Johnson, Górniak-Kocikowska, Marturano, and other writers became known as the *uniqueness debate*. Walter Maner (1996) wrote on the uniqueness of computer ethics and argued that computer ethics is an academic field in its own right with unique ethical issues. Maner (1996) argued against moral indoctrination of standards of professional conduct in computer ethics courses. Maner (1996) insisted that computer scientists be taught the meaning of responsible conduct with the focus being on the *process* by which reflective moral judgments are rendered, as opposed to *products (judgments)* that conform to the profession. Therefore, Maner

(1996) provided six levels of justification for the study of computer ethics, and provided examples to establish that unique issues exist in the field. Maner's (1996) sixth justification was, "We should study computer ethics because the set of novel and transformed issues is large enough and coherent enough to define a new field" (p. 141). However, Maner only mentioned the sixth justification as a hopeful theoretical possibility due to a lack of progress in the field. Maner (1996) then provided six reasons for the lack of progress, one being, "So far, no one has provided a complete and coherent concept of the proper subject matter for computer ethics" (p. 141).

Herman Tavani (2002) attempted to "determine what exactly is meant by the claim *computer ethics is unique*," the CEIU thesis (p. 37). Tavani (2002) used comparative analysis to clarify the positions taken in the CEIU thesis debate, along with analogies and an empirical computer case. The conclusions reached by Tavani (2002) were as follows: a) evidence that computer ethics is unique is not compelling, b) ethical issues involving ICT are deserving of consideration, and c) models of ethical analysis for computer ethics proposed by Luciano Floridi and J.W. Sanders (macroethical) and James Moor (normative) are useful.

Górniak-Kocikowska has continued to write on the topic of computer ethics as a global ethic. In (2007), Górniak-Kocikowska suggested that computer ethics has evolved into a global ICT ethics, which includes both "hard" and "soft" knowledge. Górniak-Kocikowska discussed the confusing names for "technology" and the "society" in which technology plays a primary role, and also discussed the relationship between global ICT ethics and the knowledge economy (Górniak-Kocikowska, 2007). The discussion led to a definition of global ICT ethics as an ethic focused on "the dynamics of the relationship between the weak and the strong, the rich and the poor, the healthy and the sick worldwide - and it should explore the ethical problems from the point of view of both parties involved" (Górniak-Kocikowska, 2007, p.56).

James Moor also revisited the topic of the computer revolution in subsequent writings and addressed the future of the field. In (2001), Moor divided the computer revolution into three stages: introduction, permeation, and power. Moor (2001) argued that the most serious questions involving information technology would arise in the newly entered power stage. Consequently, computer ethics will continue to flourish. Increased professionalism and increased applications of computer technology will also ensure computer ethics continues to grow as a discipline (Moor, 2001). Moor also took the position that computer ethics, as an area of applied ethics, will not produce a new ethical theory nor disappear into ordinary ethics, but will shape the meaning of ethical concepts.

Further, Moor (2005) provided a more detailed discussion of the model of technological revolutions. According to Moor (2005), ethical issues manifest at each stage (introduction, permeation, power) and issues increase as social impact increases from stage to stage. Moor (2005) argued that we are living in a period of technology in which doing ethics as normal will not be sufficient. Accordingly, ethics needs to be done "better" by recognizing that ethics is a dynamic enterprise, by establishing multi-disciplinary collaborations, and by developing more sophisticated ethical analysis (Moor, 2005). Anthony Marturano (2012) stated that comprehension of new, rich, and complex ideas, such as sophisticated ethical analysis, "take time to be absorbed in the real social fabric" (p. 128). Marturano (2012) also posited that we cannot assume technology is driving the adoption of ethical analysis.

The trouble Moor (2005) and other writers highlighted regarding the development of ethical policies keeping pace with the development of computer technology is conceptually found in the writings of William Ogburn (1922). Ogburn stated,

> Material culture in changing causes other social changes in what was defined as adaptive culture. But frequently there is a delay in the changes thus caused, so that the old adaptive culture hangs over into the new material conditions. This lag in the adaptive culture produces a period of maladjustment, which is less harmonious as an adaptation than the period which precedes or follows…If the material culture should continue to accumulate and change with increasing rapidity, it would seem that the cultural lags will pile up even more than at the present time. Such a development creates quite a task for those who would direct the course of social progress, the task of eliminating these maladjustments by making the adjustments to material changes more rapid. It is thinkable that the piling up of these cultural lags may reach such a point that they may be changed in a somewhat wholesale fashion. In such a case, the word revolution probably describes what happens. (Ogburn, 1922, pp. 278, 280)

The pace of technological change presents a time-sensitive dilemma for ethical discourse. Such lags have the potential to result in revolutionary events.

The foundation of computer ethics is another area of debate on the philosophical side of computer ethics. The inescapable interdisciplinarity of Computer Ethics (CE) makes defining, teaching, and in some cases recognizing CE as significant, difficult (Floridi, 1999). Luciano Floridi (1999) stated, “Everyone’s concern is usually nobody’s business, and CE is at too much of a crossroads of technical matters, moral and legal issues, social as well as political problems and conceptual analyses to be anyone’s own game” (p. 37). And, “as human beings, we shall always lack full ethical competence. This is why our first duty is epistemic: whenever possible, we must try to understand before acting" (Floridi, 1999, p. 45). Thus, Floridi has attempted to ground computer ethics by proposing a theoretical and methodological foundation.

Floridi (1999) presented Information Ethics (IE) as a macroethics and as the philosophical foundation of CE. IE argues that information is fundamental and that any information entity is worthy of moral consideration (Floridi, 1999). Evil is equated to entropy and good is equated to looking after and improving the "infosphere" (Floridi, 1999). IE is an ontocentric object-oriented theory, meaning every entity has an information state, which is a center of moral concern and any form of being (entity or object) is a body of information (Floridi & Sanders, 2002; Floridi, 1999). Thus, IE is info-centric, or more correctly, being-centric. Floridi (1999) compared IE to other ethical theories and argued that IE offers a better methodology for its "applied counterpart" CE in confronting issues in an information culture and society. A contribution of IE to the definition of CE is the argument that, "The moral agent…looks after the information environment and is able to bring about positive improvements in it, so as to leave the infosphere in a better state" (Floridi, 1999, p. 50).

Building on (Floridi, 1999), Floridi and J. W. Sanders (2002) reviewed the debate on the foundations of Computer Ethics (CE). Floridi and Sanders (2002) discussed five positions in the literature: the no resolution approach (NA), the professional approach (PA), the radical approach (RA), the conservative approach (CA), and the innovative approach (IA). The argument was re-made in (Floridi & Sanders, 2002) that IE, as a metaethical theory, is the foundation of CE.

Bynum (2011) noted that the term *information ethics* should be distinguished from the broader and less developed information ethics theory of Wiener:

> Although there are some similarities, Floridi's theory and Wiener's have very different goals and very different metaphysical foundations. Thus Wiener's theory is a kind of materialism grounded in the laws of physics; while Floridi's theory presupposes a Spinozian, perhaps even a Platonic, metaphysics…In Floridi's theory, but not in Wiener's, non-human entities, such as rivers, databases and stones have "rights" that ought to be respected. Floridi's "entropy" is not the entropy of physics, as it is in Wiener; Floridi's "information" is not the "Shannon information" of physics, as it is in Wiener; and Floridi's world includes non-material Platonic entities that have no place in Wiener's universe. (Bynum, 2011, note 1)

As such, (Floridi & Sanders, 2002) argued that CE is "worthy of independent study because it requires its own application-specific knowledge and is capable of supporting a methodological foundation, IE" (p. 1).

Marturano (2012), when reflecting on the development and debates of computer ethics, issued a reminder that much discussion surrounding computer ethics is not actually about computer ethics:

> For example, Floridi's *Philosophy of Information* is not actually about ethics (it is indeed tangentially about ethics) but it is – said roughly – a philosophical standpoint which starts from the idea that everything is information, and thence, an attempt – from a philosophy of science point of view – to create a theory which supports such theory. (Marturano, 2012, p. 126)

Considering Marturano's concern, this section of the literature review has highlighted historical and contextual details in the literature related directly to the development and debates of computer ethics.

Methods of Doing Computer Ethics

Scholars have discussed methods, or approaches, to *doing* computer ethics throughout the literature. Tavani (2001) reviewed the prominent methodologies in computer ethics. Moor's method, sometimes called "standard computer ethics," "the standard model," or "mainstream computer ethics," is a three-step method: 1) Identify a morally controversial practice; 2) Situate (describe and analyze) the practice; 3) Apply moral principles and judgments (moral evaluation), which may result in policy recommendations (Brey, 2000a; Tavani, 2001). Phillip Brey (2000a) raised potential issues with the standard method: a) it focuses on *existing* moral controversies, b) it focuses on *practices*, c) it focuses on the *use* of computer technology.

Therefore, Brey (2000a, 2000b) proposed another approach to computer ethics called "disclosive computer ethics." Brey (2000a) presented the shortcomings of mainstream computer ethics, and outlined disclosive computer ethics as a complimentary normative framework for doing computer ethics. Brey (2000b) discussed the methodological approach of disclosive computer ethics in more detail. In (Brey, 2000b), the aim, scope, and method of computer ethics were given, followed by a description of disclosive ethics and illustrative examples.

- *Aim* – As a branch of applied ethics, which "is concerned with the study of morality in particular domains of human practice…the aim of applied ethics is not merely to arrive at well-supported moral analysis, but also to use such analyses to affect the discourse, policies and practices that are prevalent in its domain of study" (Brey, 2000b, p. 125); "Disclosive studies in computer ethics are hence studies concerned with disclosing and evaluating embedded normativity in computer systems, applications and practices" (Brey, 2000b, p. 127).

- *Scope* – Computer ethics "includes individual and collective practices that somehow essentially involve computers" (Brey, 2000b, p. 125).
- *Method* (preferred) – "a disclosive study in computer ethics may take the form of a two-stage process. In the first stage of analysis, some technology (X) is analyzed from the point of view of a relevant moral value (Y)…which is only given a loose, common-sense definition. This analysis may yield a tentative conclusion that certain features of X tend to undermine (or perhaps sustain) Y in particular ways…This analysis may prompt a second stage in which theories…are applied and perhaps further developed so as to arrive at a more specific normative evaluation…that can also be used to arrive at policy guidelines regarding…design, use and regulation" (Brey, 2000b, p. 127).

The relevant moral values that Brey (2000a, 2000b) suggested should drive the multi-level and interdisciplinary approach were the values of justice, autonomy, democracy, and privacy.

Brey (2000b) further proposed that disclosive computer ethics research takes place at three levels:

> The disclosure level, in which philosophers, computer scientists and social scientists collaborate to disclose embedded normativity in computer systems and practices, the theoretical level, in which philosophers develop and modify moral theory, and the application level, at which individuals with good philosophical skills and a broad relevant background knowledge work on normative evaluations of computer systems and practices, drawing from research performed at the other two levels. (Brey, 2000b, pp. 128-129)

Unlike the standard method, which attempts to clarify and resolve moral issues related to computing, the method described by Brey offers an approach for *revealing* moral issues.

In a more "innovative" departure from the standard model, Floridi's (Floridi & Sanders, 2002; Floridi, 1999) methodology for computer ethics, founded on information ethics, posits that information entities should be evaluated with regard to the infosphere.

> One should also evaluate the duty of any rational being in terms of contribution to the growth of the infosphere, and any process, action or event that negatively affects the whole infosphere – not just an information object – as an increase in its level of entropy and hence an instance of evil. Without information there is no moral action, but in IE information moves from being a necessary prerequisite for any morally responsible action to being its primary object. (Floridi & Sanders, 2002, p. 8)

What makes the methodology of Floridi and Sanders both intriguing and distinct is the elevation of information itself as a focal point.

John Mingers and Geoff Walsham (2010) presented another normative approach to computer ethics called "discourse ethics." Mingers and Walsham (2010) provided an exhaustive overview of ethics in the area of information systems (IS), with a specific concentration on discourse ethics and its importance. Mingers and Walsham start by pointing out the difference, in philosophical language, between *morality* and *ethics*.

> In common language, ethics and morality tend to have similar meanings but within philosophy a distinction is drawn, although not always followed, in that morals or morality refers to particular beliefs or norms while ethics refers to the science or system of morals, or to a particular ethical code. (Mingers & Walsham, 2010, p. 834)

Thus, discourse ethics is founded on the theory of communicative action (TCA) advanced by Jürgen Habermas, and might be better described as "a discourse theory of morality" (Mingers & Walsham, 2010, p. 841).

According to Habermas (1994), such discourse occurs in the form of pragmatic, ethical, and moral questions. And although discourse applies to all three domains, the focus of discourse ethics is moral questions:

> that is, those that concern justice for all; those that transcend the interests of any particular individual, group, nation, or culture but that should apply equally for all people…a process of argumentation and debate between actually existing people (a dialogical focus). This separates discourse ethics from other approaches. (Mingers & Walsham, 2010, p. 841)

The method is not just an analytic procedure or thought experiment, "such debates, especially within society as a whole, should actually occur" (Mingers & Walsham, 2010, p. 841). The point of the process is to "generate a common will and not just an accommodation of interests" (p. 842). During the process of debate, several principles should be sustained:

> (1) the mention of *interests* and *value-orientations* refers to the participants' concerns within the pragmatic and ethical domains respectively; (2) participants should try and genuinely take on the perspectives and roles of the other, and be prepared to modify their own; and (3) agreement should be based, as always, on force of argument rather than force of power. (Mingers & Walsham, 2010, p. 842)

Mingers and Walsham (2010) also provided a useful diagram of relationships between principles of discourse (p. 843) and an approach for pragmatizing discourse ethics for the IS field.

Discourse ethics provides several advantages: a) “potential for bringing about ongoing, practical resolutions or moral and ethical concerns;” b) “pushes us to consider, and involve, as wide a range of stakeholders as possible in decisions and system designs;” and c) the recognition that “in the real world there are different types of issues, and different perspectives from which to approach them” (Mingers & Walsham, 2010, p. 844). Consequentialism, and other ethical theories, tend to focus on particular types of issues, such as economic issues. But major diversions exist in the world, such as religion and tradition.

> Pragmatic issues assume agreement among those involved about goals and values; ethical issues accept that there are genuine differences between individuals and groups but that these can be tolerated; moral issues are those that genuinely require the agreement of all affected. (Mingers & Walsham, 2010, p. 848)

Discourse ethics recognizes the plurality of issues and thus allows for solving each type of issue.

Books on Computer Ethics

Books on the topic of ethics and computing are another source for the study of computer ethics and its definition. This section presents a sample of definition content in books. Table 1 presents a more comprehensive list of books and anthologies related to computer ethics. Deborah Johnson’s (2009) book *Computer Ethics* was the first in the field, first published in 1985. The book continues to provide an extensive overview of the field, but does not specifically define *computer ethics*. Johnson (2009) did define *ethics*, and described the term *sociotechnical*, then concatenated the terms into *sociotechnical computer ethics*. Johnson (2009) explained that computer ethics “focuses specifically on the role of IT in constituting the moral world;” the “task of computer ethics is, then, to evaluate the new possibilities and fill the policy vacuums. A significant component of this task is addressing conceptual muddles;” and “the sociotechnical

Table 1: Books on Computer Ethics

Textbooks			
Author(s)	**Title**	**Edition**	**Date**
Kizza	Ethical and social issues in the information age	5th	2013
Spinello	Cyberethics: Morality and law in cyberspace	5th	2013
Baase	A gift of fire: Social, legal, and ethical issues for computing technology	4th	2012
Quinn	Ethics for the information age	5th	2012
Tavani	Ethics and technology: Controversies, questions, and strategies for ethical computing	4th	2012
Reynolds	Ethics in information technology	4th	2011
Johnson	Computer ethics	4th	2009
Barger	Computer ethics: A case-based approach	1st	2008
Stamatellos	Computer ethics: A global perspective	1st	2007
Halbert & Ingulli	Cyberethics	2nd	2004
Edgar	Morality and machines: Perspectives on computer ethics	2nd	2002
Bowyer	Ethics and computing: Living responsibly in a computerized world	2nd	2000
Hamelink	The ethics of cyberspace (translation)	1st	2000
Langford	Business computer ethics	1st	1999
Weckert & Adeney	Computer and information ethics	1st	1997
Forester & Morrison	Computer ethics: Cautionary tales and ethical dilemmas in computing	2nd	1993
Anthologies/Collections			
Editor(s)	**Title**		**Date**
Floridi	The Cambridge handbook of information and computer ethics		2010
Himma & Tavani	The handbook of information and computer ethics		2008
Quigley	Encyclopedia of information ethics and security		2008
Weckert	Computer ethics		2007
Hongladarom & Ess	Information technology ethics: Cultural perspectives		2006
Spinello & Tavani	Readings in cyberethics (2nd edition)		2004
Bynum & Rogerson	Computer ethics and professional responsibility		2003
Langford	Internet ethics		2003
Moor & Bynum	CyberPhilosophy: The intersection of philosophy and computing		2003
Ermann, Williams, & Shauf	Computers, ethics and society (3rd edition)		2002
Salehnia	Ethical issues of information systems		2002
Dhillon	Social responsibility in the information age: Issues and controversies		2001
Baird, Rosenbaum, & Ramsower	Cyberethics: Social and moral issues in the computer age		2000
Hester & Ford	Computers and ethics in the cyberage		2000
Johnson & Nissenbaum	Computers, ethics and social values		1995
Huff & Finholt	Social issues in computing: Putting computing in its place		1994
Denning	Computers under attack: Intruders, worms, and viruses		1990

perspective emphasizes that the social and technological elements are interwoven" (Johnson, 2009, pp. 21, 22, 23).

Bynum and Rogerson (2003) edited and contributed to a book on computer ethics called *Computer Ethics and Professional Responsibility*. The book is a collection of lengthy editors' notes and articles on topics within the field. In the editors' introduction, Bynum and Rogerson (2003) provided an overview of the prominent definitions of computer ethics by Walter Maner, Deborah Johnson, James Moor, Terrell Bynum, and Donald Gotterbarn. In "Chapter 1" of (Bynum & Rogerson, 2003), James Moor (2003) stated that computer ethics has two parts: "(i) the analysis of the nature and social impact of computer technology and (ii) the corresponding formulation and justification of policies for the ethical use of such technology" (Moor, 2003, p. 26).

Moor (2003) also observed that, "shortcomings and difficulties with Routine Ethics and Cultural Relativism may make one cautious about doing applied ethics at all…It is for this reason, I think, that computer scientists and others are sometimes reluctant to teach computer ethics" (p. 29). Still, every science rests on value judgments: All human enterprises are conducted within frameworks of values, and values are utilized when establishing facts (Moor, 2003). For example, computer scientists can achieve a degree of consensus about what constitutes a good computer program.

> The specific rankings may differ somewhat from person to person, but a pattern of agreement emerges about the types of program that are the best. No computer scientist regards an ineffective, untested, buggy, unstructured, undocumented, inefficient, unmaintainable code with an unfriendly interface as a good program. It just doesn't

> happen. In a sense, the shared standards define the field and determine who is qualified and, indeed, who is in the field at all. (Moor, 2003, p. 32)

Thus, ethical responsibility "begins by taking the ethical point of view. We must respect others and their core values" (p. 36). The primary threat to computer ethics is not the fallout of disagreements on policy, but "a failure to debate the ethical issues of computing technology at all" (Moor, 2003, pp. 36-37).

Stacey Edgar's (2002) book *Morality and Machines: Perspectives on Computer Ethics* explored the field of computer ethics from the perspective of a philosopher. The book's intended purpose is use as a course text for undergraduate students. The book is typical in that it begins with an overview and definition (Moor's definition) of the field of computer ethics, and then discusses morality, reason, and ethics (Edgar, 2002). Edgar also discusses common topics such as piracy, privacy, and crime. In similar fashion, Joseph Kizza (2013) attempted to address the *Ethical and Social Issues in the Information Age* from the perspective of a computer scientist. Kizza (2013) begins with the history of computing, then discusses morality, law, and ethics, then ventures into topical areas of ethics and computing (e.g., privacy, computer crime, biometrics, etc.). Kizza's book is also designed to be a text for undergraduate courses in ethics and technology.

Kizza (2013) used Moor's definition of computer ethics, but also provided a "functional definition of ethics:"

> Let the set A be the set of all possible human actions on which it is possible to pass a value judgment…So define A = $\{a_1, a_2, a_3, \ldots\}$. Let the second set B consist of many ethical or moral theories…Define B = $\{b_1, b_2, b_3, \ldots\}$. Finally, let R, the third set, be the set of all possible value judgments on the human actions in A based on the ethical

> theories in B. The function *f* maps each pair *(a,b)* of elements, with *a* € A and *b* € B to a binary value in R…R = {RIGHT or WRONG, GOOD or BAD}…Now define a function *f* on a pair of elements *(a,b)* with *a* € A and *b* € B to produce an element *r* € R as *f*: *(a,b)* → *r*. We call this function the ethics decision function…function *f* represents a sequence of explanations and reasoning on the elements of sets A and B. The elements of R have two values: 1 for GOOD or RIGHT and 0 for WRONG or BAD.
>
> Because the power of reasoning associated to each pair of elements *(a,b)*, with *a* in A and *b* in B, a binary value equivalent to good, bad, right, or wrong using the set B of ethical theories, we represent this function as follows:
>
> $$f(a,b) \rightarrow \left\{ \frac{1\{\text{"right,"or"good"}\}}{0\{\text{"bad,"or"wrong"}\}} \right. \quad \text{for all a} \in \text{A and b} \in \text{B}$$
>
> . (Kizza, 2013, p. 35)

Kizza's functional style definition is in the language of computer science, but is not practical for the computing community at large.

Herman Tavani's (2012) academic book *Ethics and Technology* is a highly regarded, comprehensive, and critical work in the field of computer ethics. Tavani's focus was mainly on networks and communication technologies, thus Tavani proposed the term *cyberethics*. Using modern ethical scenarios, Tavani (2012) discussed issues such as methodological frameworks, ethical theories, professional ethics, and specific cyberethics crimes. Tavani (2012) clearly defined and framed *cyberethics* and *cybertechnology*.

Another book on the topic and named *Cyberethics* by Richard Spinello (2010) maintained focus on Internet ethics and the regulation of the Internet. Spinello (2010) provided no direct definition of cyberethics, but declared, "The role of morality…must be the ultimate regulator of cyberspace that sets the boundaries for activities and policies. It should direct and harmonize the forces of law, code, the market, and social norms so that interactions and dealings there will be measured, fair, and just" (Spinello, 2010, p. 7).

A comprehensive resource for specific areas of information ethics, and particularly areas with a security focus, is the *Encyclopedia of Information Ethics and Security* (Quigley, 2008). Key chapters include the following: "Classifying Articles in Information Ethics and Security," which presented a study on articles published in IS-related journals (not ethics journals) from 1991-1995 that matched key search terms like *security* and *ethics*; "Ethics in Software Engineering;" "Information Ethics as Ideology;" "Meta View of Information Ethics," which presented a metaphysics/worldview study of college students; and "Taxonomy of Computer and Information Ethics," which provided a view of the ethical landscape in terms of differentiating privacy-related discourses in normal ethics, information ethics, and personal information ethics (Quigley, 2008).

Professional Ethics

Computer ethics literature also exists with an applied and professional focus. Donald Gotterbarn (1991) confronted perceived problems with computer ethics. Primarily, Gotterbarn (1991) viewed computer ethics as a clouded concept with an unmanageable definition and a misguided focus. Gotterbarn (1991) argued that computer ethics is a *professional ethics*, and that it is not unique. Gotterbarn insisted the focus should be on the *process* of developing computing artifacts. Computing professionals, and non-professionals, have a responsibility to commit to the standards developed by the profession (Gotterbarn, 1991). As a software engineer, Gotterbarn (1991) claimed that ethics for computing professionals is "ethical values, rules and judgments applied in a computing context based on professional standards and a concern for the user of the computing artifact" (COMPUTER ETHICS). Thus to Gotterbarn (1991), "the starting point of computer ethics should be organized around the standards for the way software is developed" (SOFTWARE DEVELOPMENT).

As for the development of standards and values of judgment, Gotterbarn (1991) stated, "Within the context of the development of computing artifacts there is not only a convergence of opinion about professional standards but there is a convergence about those values that we use to direct our technical judgment" (DISCOVERING THE STANDARDS). Therefore,

> When I present myself in the role of a computer professional to you, I say that I have the skill, the talent and the experience to do this job well and I say that I have the moral commitment to a set of moral values and a derivative commitment to a set of standards about software development. That is computer ethics. There is a commitment to the user. (Gotterbarn, 1991, THE COMPUTING PROFESSIONAL)

The focus of computer ethics is on individual professional responsibility. Gotterbarn (1991) also confronted the unflattering use of the term *users* for customers in the computing profession. As for non-professionals, Gotterbarn (1991) argued that, similar to practicing medicine, the professionals develop the standards, and adherence to the standards is the non-professionals guide for moral action.

A study by Leventhal, Instone, and Chilson (1992) explored how the computer science community "feels" about computer science ethics (p. 49). The study included both experts and novices. Employing a quantitative method, (Leventhal et al., 1992) indicated that identifiable patterns emerge from responses toward ethical issues in computer science. Patterns included "Right Thing to Do," "Thievery," and "Government Contract" factors. The study suggested that the "community shares a set of attitudes based on specific content…However, the responses to some issues may vary depending on the background and gender of the respondent" (Leventhal et al., 1992, p. 59). Leventhal et al. (1992) emphasized the communal aspect of professionalism by using communal terminology consistently throughout the paper: "computer science community," "professional community," "computer science educational community," "computer scientists," and "professionals."

Although Gotterbarn and other writers of professionalism maintain pressure on the individual, "a social cultural space consists of a social group…of people with whom one habitually associates, and a shared system of meanings, practices, and situations" (Skovira & Schuyler, 2009, p. 276). Such a space is a moral space, and an individual's "beliefs and behaviors are informed by a moral grammar (what is good or evil, right or wrong, and why) which tacitly structures personal relationships and actions in situations" (p. 276). Skovira and Schuyler (2009) modeled the role of moral grammar and the components of social-cultural space. William Frankena (1973), who mentioned, "morality is sometimes *defined* as an instrument of society as a whole…However…smaller groups and even individuals may have or work out such distinct guides for their conduct," also stated, "morality starts as a set of culturally defined goals and rules governing achievement of the goals, which are more or less external to the individual…" (pp. 6, 8). Additionally, group consensus does not mean an individual thinker must bow to the judgment of the majority (Frankena, 1973).

Maintaining a focus on professionalism, in a later article Gotterbarn (2001) claimed that for computing practitioners to become computing professionals, practitioners must accept an additional layer of positive responsibility. Gotterbarn (2001) argued that responsibility avoidance is a problem in the computing field and that if professionals would adopt a sense of positive responsibility, the problems in software development would decrease. Positive responsibility looks backward (what happened) and forward (what is possible). Positive responsibility is concerned not only with meeting the needs of the “client,” but is concerned with meeting the needs of the “user” (Gotterbarn, 2001). A computing professional uses their skills for the good of society (Gotterbarn, 2001).

A seminal *MIS Quarterly* article by Richard Mason (1986) provided the PAPA framework for professionals: Privacy, Accuracy, Property, and Accessibility. Mason (1986) provided detailed overviews of each area, along with questions and examples. A point of reference in the history of ethics and computing, Mason (1986) stated, “Our moral imperative is clear. We must insure that information technology, and the information it handles, are used to enhance the dignity of mankind. To achieve these goals we must formulate a new social contract, one that insures everyone the right to fulfill his or her own human potential” (Mason, 1986, p. 11).

H. Jeff Smith (2002) discussed the specific relationship between ethics and the professional field of information systems (IS). Smith (2002) stated, “it does appear that the I/S community is operating in an ambiguous ethical space, in which clear definitions of right and wrong are often elusive ones” (p. 8). Therefore, Smith (2002) provided a framework for people attempting to resolve ethical quandaries and demonstrated the framework’s use with an America Online (AOL) case. Smith’s (2002) premise was that people may find themselves confused by the differing approaches of philosophical ethics, business ethics, and sets of codified rules. Smith described the ethical categories in detail and elaborated on the linkages between the categories.

> While it is a normal human reaction to desire closure and a clear roadmap for such decisions, resolution of ethical quandaries is not always that simple. A firm, organization, or society can impose certain rules on its members and can enforce those rules by threat

> of firing, revocation of membership, ostracism, or even incarceration. But it is still left to the *individual* to decide which norms and standards will guide his or her own ethical argumentation. Thus, gaining clarity with respect to the different ethical frameworks – and the linkages between them – becomes a critical objective. (Smith, 2002, p. 20)

Smith also suggested that an opportunity exists for research in normatively debating codified rules.

Kenneth Laudon (1995) discussed the specific relationship between ethics and the professional field of information technology (IT). Laudon (1995) highlighted important points about ethics, which relate to its definition and characteristics within the literature and within a business context. First, Laudon (1995) identified issues with the early IT ethics literature: a) content was not well grounded in ethical theories or the language of ethics, b) content was often in response to pressing social problems, and c) content had an atomistic and individual orientation. Laudon (1995) discussed what ethics *is* and what ethics *is about*, including unifying themes and underlying tensions. Laudon (1995) claimed, "Ethical action comes from the decisions of individuals based on personal conviction. We cannot rely on history, logic, empirical analysis, or the marketplace" (p. 39). Mistakes are bound to occur in IT because ethical situations involving IT are new and different opportunities for moral action, and calculating consequences can be difficult (Laudon, 1995). Ethics then, "should be seen as a process of human understanding and reasoning, not as a static condition that is achieved" (p. 39).

Dorantes, Hewitt, and Goles (2006) provided an example of research on ethical decision-making in an IT context. The focus of (Dorantes et al., 2006) was on models of ethical decision-making. The findings of the study suggested that moral intensity is influenced by personal characteristics, and thus moral intensity influences various stages of the decision-making process. Dorantes et al. (2006) mentioned that even though organizations develop and adopt codes of conduct, individuals stray from codes. Dorantes, Hewitt, and Goles (2006) claimed that education can contribute to diminishing the problem, however "before implementing educational programs it is necessary to understand why individuals behave unethically in an IT context" (p. 206). Thus, the study premise was that individuals employ the same decision-making process when confronted by an ethical dilemma in an IT context versus a non-IT context.

The Future of Computer Ethics

In 2001, Herman Tavani provided an update on the state of computer ethics as a philosophical field of study. Tavani (2001) included a brief overview of the uniqueness debate, methodologies, the life-span debate, technological convergence, the importance of philosophers in computer ethics, and resources. Tavani (2001) also elaborated on the discussion about the name of the field, computer ethics as viewed by philosophers versus practitioners, and the confusion of genuine ethical issues with social issues. In academia, the constant combination of the "ethical" and the "social" has led to a trend of applying *computer ethics* to mean almost anything in the realm of *social issues in computing* (Tavani, 2001). Computer ethics is not the only applied ethics field experiencing the conflation: so is business ethics, environmental ethics, and so on (Tavani, 2001). Sometimes, writings that express terms such as *computer ethics* or *cyberethics* have little or nothing to do with *ethics* (Tavani, 2001). Thus, Tavani (2001) argued that genuine ethical issues need to be sorted from social issues. In some non-humanities academies, in locations such as Italy, ethics is understood to be personal, thus social responsibility and ethics fall into separate fields (Marturano, 2012). However, not all writers believe such a separation is proper or possible.

John Weckert (2001) also wrote on the future directions of computer ethics. Weckert (2001) provided examples of issues needing attention in computer ethics: privacy, employee monitoring, responsibility, equity and human-computer interaction (HCI), and a few others. Weckert (2001) stated that, "computer ethics must become more rigorous and develop a stronger theoretical base" (p. 93). Definitions contribute to rigor and a theoretical base. Also, (Weckert, 2001) used the term *information technology* in combination with *computer ethics*. Though study in computer ethics may have initially been focused on stand-alone computer systems, there is growing concern related to communication technologies (Weckert, 2001).

Weckert (2001) believed that if "computer ethics is to be taken seriously and is to affect real life, there must be rigorous and theoretically sound examination of practical problems, and it must propose answers within the parameters of the available technology" (p. 96). An example of Weckert's considerations was a web-based encyclopedia that is inaccessible to the blind. Is such an interface unfair? Weckert (2001) debated the positions and then stated a "reasonable" rule: "A web site should be equally useable to all potential users except where the cost of implementing it would render the site unavailable to all" (p. 95).

Weckert (2001) concluded by providing three considerations about the usefulness of computer ethics: 1) "those working in computer ethics need to be involved in policy making," 2) "there must be involvement in the education of computing professionals and users," 3) "computer ethicists should continually question what is happening in the world of Information Technology" (p. 96). Furthermore,

> Questioning encourages thinking, and this heightens awareness of problems, and hopefully, makes more people just a little worried. Computer ethics is not a panacea for

> the world's problems, but it is a valuable endeavor if it ethically challenges IT professionals and users. (Weckert, 2001, p. 96)

The logic of (Weckert, 2001) and the examples Weckert provided would be useful in teaching computer ethics.

Bernd Stahl (2011a) provided an updated look at the future of ethics in relation to ICTs (called "ICT ethics" on p. 153). As an introduction to the ethical issues of emerging ICT applications (ETICA) project, (Stahl, 2011a) presented results of a discourse analysis of publications on emerging ICTs. The ICT candidates "likely to have significantly increasing social impact in the next ten-15 years" included the following areas: affective computing, ambient intelligence, artificial intelligence, bioelectronics, cloud computing, future internet, human-machine symbiosis, neuroelectronics, quantum computing, robotics, and virtual/augmented reality (Stahl, 2011a, p. 144). The ethical issues associated with the ICTs formed the following categories: conceptual issues, ethical theories, uncertainty of outcomes, technical enablers, impact on individual, perceptions of technology, role of humans, and social consequences (Stahl, 2011a).

With the aim of the ETICA project being responsible innovation, (Stahl, 2011a) made the following points:

- "Responsibility can be defined as a social construct of ascription" (p. 151).
- Responsibility is "an attempt to achieve socially desirable outcomes" (p. 151).
- "Responsibility ascriptions always take place in concrete situations and are always entangled in a complex web of different ascriptions" (p. 151).
- "While it may be analytically desirable to disentangle these responsibilities, they always co-exist in practice" (p. 151).

- "Innovation is not seen as an aim in itself but a contributing factor to the overall good" (p. 151).
- "Sustainability and social inclusion are two of the values that need to be considered in innovation" (p. 151).
- Policy makers "are responsible for the framework of responsibility" (p. 152).
- Subjects (e.g., companies, researchers, technicians, society, representatives) involved in the technology research and development process, "will be responsible for individual technologies and their consequences in a range of different ways" (p. 152).

Then, (Stahl, 2011a) provided recommendations to policy makers for developing a framework and infrastructure that a) supports ethical impact assessment, b) provides a set of content required for responsibility ascriptions, and c) allows civil society and stakeholders to engage with political and technical communities. Stahl (2011a) called on industry, researchers, and civil society organizations to a) incorporate ethics into ICT research and development, and b) facilitate ethical reflexivity in ICT projects and practice. Each suggestion was accompanied by specific recommendations.

Every community has values, and a community can "embed these ethical values into technology and ensure that they are considered during all stages of the technology life cycle" (Stahl, 2011a, p. 141).

> Industry, researchers and other individuals or organizations should adhere to the…recommendations in order to be proactive and allow innovation to be socially responsible. If the institutional framework, background, repository and societal discourses are there, then the conditions will be favourable for the incorporation of ethics and reflexivity into technical work and application usage. (Stahl, 2011a, p. 153)

Stahl, in agreement with other writers all the way back to Moor (1985), emphasized that ethics is not merely tangential to computing, but rather requires a new way of thinking about the development of computing technology in relation to social values.

Ethics in Computing Education

The purpose of this research study was to present a synthesized definition and framework of computing ethics, which provides computing educators with a foundation on which ethics content can be developed. In the 1970s, Walter Maner pioneered the teaching of computer ethics in higher education with a course and "Starter kit on teaching computer ethics" (Maner, 1980). But as the field and topic developed, computer ethics became unmanageable, clouded, and of little consequence (Gotterbarn, 1991). Such problems exist in the philosophical discourse and in the educational discourse. This section presents literature on ethics education in computing, which is relevant to developing a coherent concept of computing ethics.

Curriculum Models and Accreditation

A primary source of ethics language in computing education is located in the computing curriculum models published by ACM. Each formal computing discipline has an accompanying curriculum model. The *Computer Science Curriculum 2008* (Cassel et al., 2008) outlines a model curriculum for computer science programs. *Computer Engineering 2004* (Soldan et al., 2004) outlines a model curriculum for computer engineering programs. *Software Engineering 2004* (LeBlanc et al., 2004) outlines a model curriculum for software engineering programs. *Information Technology 2008* (Lunt et al., 2008) outlines a model curriculum for information technology programs. *IS 2010* (Topi et al., 2010) outlines a model curriculum for information systems programs.

In 2006 ACM published *Computing Curricula 2005: The Overview Report* (Shackelford et al., 2006) to distinguish the field of computing and its sub-disciplines. Though ACM and the Institute of Electrical and Electronics Engineers – Computer Society (IEEE-CS) commissioned the curriculum models, and ACM and the Association for Information Systems (AIS) in the case of the IS model, the reports are a collective effort of both professionals and academics in the field of computing. Broadly, the reports suggest course lists, sequences, and hours spent on topical areas to achieve effective computing programs. Each model addresses, to varying extents, the inclusion of ethics content in computing programs.

An additional piece of computing education is accreditation. ABET (ABET being the formal name) is an organization that publishes accreditation requirements for computing programs. Though ABET accreditation is optional, many computing programs aspire to obtain ABET accreditation. ABET publishes two separate criteria documents for computing disciplines. The first is "Criteria for Accrediting Computing Programs," (CAC), which addresses computer science, information systems, and information technology programs. The second is "Criteria for Accrediting Engineering Programs," (CAE), which addresses electrical and computer engineering, and software engineering, among other engineering programs. CAC accreditation includes the following criteria: "an understanding of professional, ethical, legal, security and social issues and responsibilities" and "an ability to analyze the local and global impact of computing on individuals, organizations, and society" ("Criteria for accrediting computing programs 2013-2014," 2012, p. 3). CAE accreditation includes the following criteria: "an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability," "an understanding of professional and ethical responsibility," and "the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context" ("Criteria for accrediting engineering programs 2013-2014," 2012, p. 3).

Integrating and Teaching Computer Ethics

Computer technology is linked to most other disciplines and thus some work in computer ethics education calls for integration across all programs. In a project supported by the National Science Foundation (NSF), Marion Ben-Jacob (2005) provided an example of an institution's efforts to integrate computer ethics content across the curriculum. The study highlighted topics that span across disciplines and the paper is a description of the project. The main tool developed throughout the project was a module format for topics in computer ethics. The paper provided an example of a module on plagiarism. Faculty completed pre and post surveys on attitudes toward computer ethics. The results showed that after the project activities, attitudes were more strongly agreeing with the importance of computing ethics for computing majors and its integration across the general education curriculum (Ben-Jacob, 2005).

Another area of research is the integration of ethics content specifically in computing programs. A significant project called ImpactCS (Huff & Martin, 1995; Martin & Weltz, 1999) was undertaken in the 1990s to conceptualize and inform the computer science community about integrating ethics in CS programs. Though the project focused on CS education, Martin and Weltz (1999) stated the frameworks could also be used in other technically-oriented curricula. Teachers know the difficulties of "teaching" ethics, and typical courses on computer ethics are meant to make students aware of issues (Martin & Weltz, 1999). However, methods based on moral theory and reasoning could help move students from awareness to action (Martin & Weltz, 1999).

The first phase of ImpactCS sought to “define the core content and pedagogical objectives for integrating social impact and ethics into the computer science curriculum” (Huff & Martin, 1995, p. 76). Educators reported that the lack of content and pedagogical elements was one of the major problems hampering the implementation of curricular change (Martin & Weltz, 1999). The topics of ethical analysis conceptualized by 25 experts in computer ethics were as follows: quality of life, use of power, risks and reliability, property rights, privacy, equity and access, and honesty and deception (Huff & Martin, 1995). By the end of the project, two more topics were added: individual responsibility and professional responsibility (Martin & Weltz, 1999). The framework called for elements of philosophy and sociology to be “incorporated into the core of computer science” (Martin & Weltz, 1999, p. 8).

Carol Spradling (2007) conducted a dissertation project that sought to investigate the integration of computer ethics into undergraduate CS programs in the United States. Spradling (2007) used a quantitative survey method to examine the status of social and professional ethics in CS programs nationwide. Specifically, the study surveyed CS faculty members and the results were based on the faculty perspectives. The study found 1) most universities and colleges (87%) integrate computer ethics in CS curricula, 2) a majority of universities and colleges (41%) integrate computer ethics into multiple courses, 3) few schools (22%) provide special computer ethics training for faculty, 4) most faculty agree that ethics should be taught in CS curricula, 5) decisions about computer ethics incorporation are mainly made by committee, 6) a large percentage of CS faculty (85%) teach ethics, 7) a variety (e.g., lectures, discussions, readings, case studies) of pedagogical instructional methods are used, 8) some knowledge units required by the 2001 CS curriculum model are not fully covered and computer crime has the highest percentage of coverage, 9) the major reason schools do not teach ethics is because CS faculty have not been trained (Spradling, 2007).

Mary Califf and Mary Goodwin (2005) discussed issues involved with integrating ethics content in computing programs and specifically in core programming courses. The Califf and Goodwin study highlighted a few challenges with integration and suggested, “that people haven’t written a lot about incorporating ethics material into the programming-intensive courses because it’s hard to do” (Califf & Goodwin, 2005, p. 348). The challenges included the following points: a) with the courses being highly technical, students expect to learn how to do things, whereas ethics is “fuzzy material that faculty might view as disconnected;” b) with the first two programming courses in the major, students lack a background, and thus faculty have difficulty finding content that students fully understand; c) with programming courses being time-consuming for both faculty and students, ethics activities can become a burden (p. 348). Califf and Goodwin (2005) then offered case study examples they had found useful when integrating ethics into core programming courses.

Melissa Dark and Jeanne Winstead (2005) addressed theories and methods that may assist the teaching of ethics in computing. Dark and Winstead used the term *computing*, however their discussion focused specifically on information security ethics. Speaking of the challenges of teaching ethics, Dark and Winstead (2005) noted, “technical educators are less familiar and sometimes uncomfortable with teaching a topic such as ethics because it is not positivistic in nature” (p. 27). Also, related to the definition of ethics, a faculty member in one discussion stated, “A common definition of ethics is ‘doing what is right when no one is looking’” (p. 27).

Dark and Winstead (2005) believed that, “the goal of teaching computing ethics is not to teach students what is right and wrong…Rather, we suggest that the aim should be to create an environment that allows students to safely question and reflect on their moral beliefs relative to their future professions" (p. 28). Dark and Winstead (2005) raised the question to educators: Are "they are responsible for helping students develop morally" (p. 29)? Dark and Winstead (2005) detailed the changes they wished to elicit within students, and discussed behaviorism, cognitivism, constructivism, and critical theory in relation to teaching computing ethics.

Some researchers have recommended non-intrusive methods of ethics instruction. In (Greening et al., 2004), educators remarked that the literature lacks support "for the education and training of academic staff" in the area of incorporating ethical content (p. 92). One starting point is codes of ethics, but "reliance on these documents as a pedagogical tool is unlikely to be found satisfying over time" (p. 92). Another risk is students adopting ethics content as "shallow," which leads students to disowning the content or equating ethics content to something such as law (an act is ethical if it is legal) (Greening et al., 2004).

Therefore, (Greening et al., 2004) provided an integration method using a scenario-based survey instrument. Greening et al. (2004) used a survey as a teaching device, as opposed to a research device, to explore ethical issues with students. The educators distributed four surveys with eight variations and two questions throughout a semester (Greening et al., 2004). The questions asked students to provide opinions about behavior in scenarios. The authors claimed that the approach helps satisfy the accreditation ethical mandate, and does not require radical deviation from technical content, while also meeting some of the challenges of integrating ethics content (Greening et al., 2004). "The use of the survey instrument described is a simple idea. It is easy to implement and to modify ethical content to specific technical material. It also…does not intrude deeply into existing structure" (p. 97).

Definition was not only a goal of this research study, but was also a teaching method suggested by C.J. Guenther (1997) for teaching social responsibility. Guenther (1997) stated, “students need to be encouraged to formulate definitions of social responsibility, to compare their definition with those of others, and to begin incorporating social responsibility into their future employment plans” (p. 19). Richard Botting (2005) provided another example of teaching ethics in computer science with an empirical assessment. The perspective taken in (Botting, 2005) was that the instructor gave particular attention to the ethics of teaching the course, while teaching ethics to CS students, the instructor *walked the walk*. The required course was “Ethics and Professionalism” and the course focused on topics typically grouped together in such courses: professionalism, ethics, legal issues, social impact, and the role of computer technology. The course goals illustrated the topics and were stated as follows: “*To help improve your long term survival in computing by increasing your knowledge, awareness, and thinking about nonmechanical problems facing a computing professional. To help you act better when faced with difficult choices*” (Botting, 2005, p. 343).

Educators have also provided tools for *grading* ethics. Moskal, Miller, and King (2002) presented and demonstrated a rubric for grading essays in a computer ethics course. The purpose of (Moskal et al., 2002) was to contribute a tool that assists CS teachers in understanding and teaching computer ethics. Alton Sanders (2005) also presented and described a format and grading scheme for a discussion course in computing ethics. Sanders (2005) referred to computing ethics as professional ethics, and the work maintained a professional focus. Sanders (2005) stated three problems that CS faculty members encounter when teaching ethics: 1) the nature of the material, 2) the desirability of class discussion, and 3) grading of non-technical material. Sanders (2005) also insisted that computing faculty should teach such a course, since ethics is a part of the profession.

Computer science is not the only computing discipline that has received attention in the discourse on teaching ethics. Bernd Stahl (2011b) focused on teaching ethical reflexivity in ICT and IS. Stahl (2011b) included a framework of ethical issues by distinguishing between a) moral intuition, b) explicit morality, c) ethical theory, and d) meta-ethical reflection. Stahl's goal was to expose the complexity of ethical issues, and claimed that while ethical reflexivity is a goal in educating ICT and IS students, how to achieve reflexivity is more difficult (Stahl, 2011b). Ethical reflexivity "requires an ability and willingness to engage in discourses and to question one's own position" (Stahl, 2011b, p. 259). Stahl (2011a) provided a categorization of ICT developments, suggesting areas of concentration for ethical discourse in relation to ICT. Stahl (2011b) mentioned several educational strategies, but essentially issued a call for teaching approaches.

Matthew Charlesworth (2005), in an African-based thesis project, proposed a course module on ethics in information systems. The major components of the thesis were as follows: a) an overview of moral philosophies, b) an overview of ethical theories (specifically in computer ethics), c) an overview and comparison of ethics in the computing model curricula, d) discussion of empirical studies of ethics in IT/IS industry and academia, and e) a proposal of a new course module on ethics in IS (Charlesworth, 2005). Results of the study showed, "the majority of institutions currently integrate Computer Ethics across 5% of the curriculum, across all years (but in varying degrees). Staff from the CS / IS departments, teach the course (confirming the observations of the literature)" (Charlesworth, 2005, p. 162). Charlesworth (2005) provided a detailed description of the proposed model for teaching ethics in IS.

Camille Rogers (2011) also conducted a dissertation project related to an ethics course model in an IS program. Rogers' study examined a course model used in an IS program at one university to examine if the model was effective in teaching ethical characteristics recommended by the IS2002 model curriculum (Rogers, 2011). Rogers (2011) used a quantitative survey method to assess the effectiveness of the ethics instruction, while using a qualitative data analysis of online discussions and a written assignment to evaluate teaching techniques. The study was comprised of three phases: 1) implementing specific ethics instruction in an IS course, 2) a comparative analysis of the case study teaching methods with curriculum guidelines, 3) evaluation of the students' perception of teaching effectiveness using the mixed methods approach (Rogers, 2011). The results of the study suggested that the ethics instruction in the course was effective, and that the teaching techniques led to increased awareness and ability of most students to reflect ethically as IS professionals (Rogers, 2011).

A teaching example provided by (Hilton & Mowry, 2005) showed the collaborative efforts of a Management Information Systems (MIS) educator and a Sociology educator to teach IS ethics in an MIS course through service-learning. The authors stated, "MIS ethics education has two parts: 1) teaching the rules and 2) evoking ethical behavior" (Hilton & Mowry, 2005, p. 35). Hilton and Mowry (2005) simply traced IS content development from foundational theories, to business ethics, to principles of ethical behavior among IS users and developers. Other topics included were norms across cultures and participating in developing and maintaining ethics guidelines (Hilton & Mowry, 2005). Similar to (Martin & Weltz, 1999), Hilton and Mowry (2005) were interested in bridging the gap between "what we know and how we act" (p. 36). Similar to other authors, (Hilton & Mowry, 2005) highlighted literature on common approaches to teaching ethics: IS ethics cases, personal reflection essays, penalties for academic dishonesty, and testimonials from guest speakers. The paper presented a case study of a senior capstone course on IS ethics that has a community service-learning requirement, and thoughts related to the running of the course (Hilton & Mowry, 2005). Via service-learning, “About half the students reported ethically significant experiences” (p. 39).

Teaching ethics content in software engineering (SWE) has also received attention. Elizabeth Towell (2003) conducted a pilot study of SWE educators’ teaching of ethics in SWE programs. Towell (2003) addressed a) categories of ethics, b) definition (Webster’s), c) focus of ethics in SWE (pp. 151-152), d) codes familiar to SWE educators (pp. 154-156), and d) teaching of ethics (pp. 153-154). Towell sent a survey to educators who attended an SWE conference, and had 36 responses (28% response rate). Top results of the survey were as follows: a) quality and testing is considered the most critical ethical topic, b) discussions of personal experiences and codes of ethics were the most employed teaching methods, c) most educators spend 1-5% of class time on ethical issues, and d) most ethical content is focused in a few courses (Towell, 2003).

In a continuation of Towell’s (2003) work, (Towell & Thompson, 2004) further explored the teaching of ethics in SWE programs. Towell and Thompson (2004) summarized the previous work and the authors offered strategies for teaching ethics in a professional SWE program. Towell and Thompson (2004) also provided the results of a second and more comprehensive survey. Though the response rate was low, 72 responses (10%), the results provided more insight into ethics education in SWE. Major results were a) “Over 40% of the academic respondents said that the teaching of ethics in their curriculum was largely ignored;” b) 24% indicated ethics was delivered in a single course, and a “very small number indicated that ethics was woven throughout the curriculum;” and c) comments such as, “‘We are an accredited undergrad CS program. We made room for an ethics course, and probably would do more except that we would not know what material to remove in order to put other material in,'" and "it is more important to 'live these categories instead of teaching them'" were submitted (Towell & Thompson, 2004, p. 42).

Further, the topics SWE educators considered most critical were "liability and risks" and "intellectual property" (Towell & Thompson, 2004). The least critical were "measurement-related ethics" and "power relationships" (Towell & Thompson, 2004). Some respondents indicated, "the biggest ethical problems in software engineering…are the choices that technical professionals have to make when telling management hard truths regarding scheduling, quality, and team dynamics" (Towell & Thompson, 2004, p. 43). The results of methods used in teaching ethics were similar to the initial 2003 study.

As evidenced by the sources in this section, educators primarily focus on undergraduate computing ethics education. However, graduate-level computing ethics education is also important. A study by Dexter, Buchanan, Dins, Fleischmann, and Miller (2013) characterized the need for graduate ethics education. As with undergraduate programs, some graduate programs require an ethics course, some offer an elective course, while others rely on ethics integration. In the study, (Dexter et al., 2013) found "generally strong support for graduate-level coursework in information/computer ethics from both faculty and students" (p. 157). Also, students who reported undergraduate exposure to ethics were more likely to suggest an understanding of what ethics is and a preparedness for professional challenges (Dexter et al., 2013).

The survey administered to four educational institutions in (Dexter et al., 2013) raised three particular points of interest for this study. First, (Dexter et al., 2013) measured student agreement with the statement, "I understand what information/computer ethics is," to which 90%

of students agreed. So, generally, students believe themselves to be familiar with ethics. Second, when asked to give a definition of ethics, the themes most frequently cited by the students were as follows: doing right (20.08%), morality (9.64%), decision-making (8.84%), codes of conduct (6.43%), common good (6.02%), and religion (1.61%) (Dexter et al., 2013). Third, when asked to provide an example of a major ethical issue in the students' profession, the themes most frequently cited were as follows: collecting and storage of personal data (11.24%), copyright infringement vs. fair use (9%), business concerns (7.63%), access to information (6.02%), piracy (4.02%), plagiarism (2.41%), and licensing (2.01%) (Dexter et al., 2013). The preliminary findings of (Dexter et al., 2013) provide points of comparison for the thematic results of this study: Do the definition and ethical issue themes raised by the students match definition and subject matter themes raised in this study? The answer may suggest if students really understand computer ethics.

Who Should Teach Computer Ethics

A topic of much debate in academia is who should teach ethics. In a 1994 feature article in *Computers and Society*, Deborah Johnson (1994) argued, "it is best for philosophers trained in ethics and social scientists to teach, respectively, courses in computer ethics and courses in computers and society" (p. 6). Anthony Marturano (2012) has argued that, "talking about ethics properly will save applied ethics and computer ethics lives, leaving ethical discussions to non professional ethicists, as is going to happen, will make ethical decisions trivial and emptied of their real meaning" (p. 128). Johnson did admit a drawback to such an approach is that students may view the courses as disconnected or less important if CS faculty do not teach the courses. Also, Johnson (1994) suggested that the topics be introduced in technical courses when possible, and that perhaps the best candidates to teach computer ethics are computer scientists who have "practiced in the real world, and been trained beyond the undergraduate level in philosophical ethics and/or the social sciences…, but how many such people are there?" (p. 7).

Johnson's (1994) proposition elicited numerous responses, with the consensus being that computing faculty should teach computer ethics. Diane Martin stated, "the ultimate responsibility for computer science curriculum must lie with computer science professors…What is essential…is that any of the approaches be a required part of the curriculum and that they be taught by the regular computer science faculty," and faculty should emphasize to students that social impact issues are fundamental to CS and not tangential topics (Johnson, 1994, p. 8). Charles Dunlop stated that any teacher, "had better make a serious effort to become conversant with developments in a **large number** of areas beyond their 'official' discipline" (p. 10). However, Dunlop did recognize in the case of computing faculty that university politics can get in the way. Courses on computers and society end up in want of a home, and faculty who work on such topics are often not taken seriously, so "we all need to work to make our institutions perceive the legitimacy of studying the social dimensions of computing" (Johnson, 1994, p. 10). In response to Johnson (1994), Walter Maner (p. 10) argued that everyone develops ethical expertise through living and that ethical training will never make anyone an expert, therefore educators trained in an acquirable expertise, such as computing, should teach computer ethics.

Other responses to (Johnson, 1994) included Leslie Shade's (p. 11) position that the course being taught is the most important fact, and the audience needs to be broader than just computing faculty and students. Greg White suggested either a computer scientist or philosopher could teach the course, "provided the individual has the appropriate understanding of both topics" (p. 12). White and Donald Gotterbarn (p. 13) both argued that computer scientists are in a better position to be trained in ethical theories and strategies. Overall, the sentiment was that computing faculty should teach computer ethics, and computers and society courses, because CS faculty better understand the implications of technical concepts. Also, as detailed previously in this literature review, some studies have shown that computing faculty *are* teaching the majority of computer ethics courses in computing programs (Charlesworth, 2005; Spradling, 2007).

This section of the literature review has integratively described approaches to ethics content delivery in computing education. Referring to the ethics taxonomy (categories), most ethics content in computing is of an applied nature. Less computing ethics content is normative or meta-ethical in nature. Similar to Stahl's (2011b) call, Marturano (2012) has stated, "we need more ethics in the sense of more ethical education…more humanity-based education" (p. 128). A "better ethics requires, at the end, a better understanding of metaethics and normative/critical reasoning" (Marturano, 2012, p. 128).

Computing Codes of Ethics

As described in the previous section, groups have developed curriculum models for computing education with the purpose of adequately preparing computing students to enter the professional computing industry. Professional and academic computing associations have shouldered the responsibility of developing the curriculum models. The computing societies have not only prescribed ethics education as a core component of computing education, but have created codes of ethics for association members. When a student enters a computing profession and becomes a professional association member, they agree to abide by the code of ethics established by the association. Societal codes of ethics represent another perspective in the study of computing and ethics.

The associations most relevant to this study are the ACM, IEEE, AIS, Association of Information Technology Professionals (AITP), and ABET. Each association code has a title: the

"ACM Code of Ethics and Professional Conduct" (1992), the "IEEE Code of Ethics" (1990), the "AIS Code of Research Conduct" (2009), the "AITP Code of Ethics" and "AITP Standards of Conduct" (n.d., n.d.), and the "ABET Code of Ethics of Engineers" (1977). The codes do not contain definitions of ethics, though meaning can be deduced based on the characteristics of the codes.

Each code provides a different abstract perspective. For example, the IEEE code is 10 active professional principles, which members agree to *do*. The ACM code states imperatives that are active, but with a *virtue* tone. The AIS code is a list of *do not's* and *do's*. The AIS code also has a focus on ethics related to research. The two AITP codes focus on behavior and personal obligations to the profession. ABET presents their code as canons and is clearly focused on professional engineering concerns. Another code related to this study, which was a collaborative effort between IEEE-CS and ACM, is the "Software Engineering Code of Ethics and Professional Practice" (Gotterbarn, Miller, & Rogerson, 1999). Finally, a general code sometimes cited in the literature is the "Ten Commandments of Computer Ethics" published by the Computer Ethics Institute (1992). Again, the meaning of *ethics* in the additional organizational codes offered could be deduced from the principles.

Just as this study seeks a synthesized definition and framework for ethics in computing, Effy Oz (1992) sought for a unified professional code of ethics. Oz's study was a comparative analysis of five computing associations' professional ethical codes: the Data Processing Management Association, the Institute for Certification of Computer Professionals, the Association for Computing Machinery, the Canadian Information Processing Society, and the British Computer Society. Oz (1992) used a framework based on obligations to compare the five codes. The purpose was to show the similarities and differences between the codes, and to issue a call for a unified international code of ethics that resolves differences and alleviates issues of conflict in the IS profession. Oz (1992) also argued that a unified code would better achieve the objectives of the professional codes of ethics and enhance the public's perception of the IS profession.

Susan Harrington (1996) conducted another study to determine if codes of ethics influenced computer abuse judgments and intentions. The results suggested that codes of ethics do have an effect, albeit small and only related to certain abuses (Harrington, 1996). Harrington suggested that any effect at all should be considered a success. Also, managers should use a multifaceted approach and not depend solely on codes of ethics (Harrington, 1996).

Ethics in Related Disciplines

As a field of study and professionalism, computing has direct relationships to other fields. Work in ethics is also happening in the adjoining fields. Some of the work results in overlap with computer ethics, which provides an opportunity for comparison. As Dewey and Tufts (1906) stated,

> Until we have been led by some such means to compare our own conduct with that of others it probably does not occur to us that our own standards are also peculiar, and hence in need of explanation. It is as difficult scientifically as it is personally "to see ourselves as others see us." It is doubtless true that to see ourselves merely as others see us would not be enough. Complete moral analysis requires us to take into our reckoning motives and purposes which may perhaps be undiscoverable by the "others." But it is a great aid…if we can sharpen our vision and awaken our attention by…comparative study. (Dewey & Tufts, 1906, p. 4)

Therefore, it is important to consider ethics literature in fields tightly coupled with computing.

Richard De George (2006) has made an effort to show overlap between computer ethics and business ethics. De George (2006) referred to both ethics as areas of applied ethics and used intellectual property and outsourcing of services to illustrate the overlap. De George urged a global perspective when discussing and developing ethical guidelines. Regarding the relationship between business ethics and computer ethics, De George (2006) stated, “The artificial division…is a product of historical accident that should not stand in the way of those in both areas from joining forces in the discussion of issues of concern to both” (p. 40).

Floridi (2009) also presented the idea that business ethics (BE) shares somewhat of a conceptual foundation with information ethics. Though Floridi had previously discussed IE as a macroethics, (Floridi, 2009) referred to both BE and IE as research fields in applied ethics. Floridi (2009) made the point that though IE and BE have conversed some, the fields remain largely independent, though ICT and networks are breaking down barriers. Thus, another ethics name was given: network ethics. Floridi (2009) re-issued a thought from business ethicists that, “It is to be hoped that the information society will be judged, by future generations, as business-friendly, and that such friendliness will be repaid by the respect and care exercised towards the infosphere by the business agents inhabiting it” (Floridi, 2009, p. 658).

Kimball Marshall (1999) discussed technology in relation to ethics and provided a definition of ethics, but the work was located within the business ethics literature. The main point of (Marshall, 1999) was to compare technology and ethics development from the perspective of William Ogburn's (1922) theory of cultural lag. Marshall used example technologies to illustrate that material technologies (material culture) develop at a faster rate than ethical guidelines (non-material culture). Marshall (1999) stated that ethical challenges “are not created by the inventors of the technologies. These are the results of a natural technology development" as understood from Ogburn's perspective (Marshall, 1999, p. 86). Also, "social consensus is not a requirement for an ethical perspective, [but] social consensus must be developed if an ethical perspective is to have broad, practical impact in the social world" (p. 88). The difficult challenge for modern ethicists is "how to develop more effective adaptive mechanisms to stimulate public awareness, reasoned dialogue and social consensus regarding new, technological achievements" (p. 88).

Like (Marshall, 1999), literature on the topic of technology and ethics, or more specifically *computer ethics*, can be found throughout the business literature. The *Journal of Business Ethics* is one prominent avenue for such work. Another example from this stream is Margaret Pierce and John Henry (1996) who conducted a research study to present an ethical decision model and suggest what codes (personal, informal, and formal) influence ethical decisions related to computer use. Pierce and Henry (1996) administered a survey to IS professionals to determine the roles of each code-type in decision-making. The focus of the study was on professional codes and computer use. Various manager types made up a majority of the respondents, whereas programmers and engineers made up a smaller portion. Pierce and Henry (1996) used Deborah Johnson's notion of computer ethics and specifically highlighted CS and IS educators in the study, but the reference list exemplifies the separation between *computer ethics* in a business context versus *computer ethics* in a computing context.

Engineering ethics is another field closely related to computer ethics. In the United States, both emerged as academic fields in the 1980s as practitioners became "increasingly aware of the social and ethical implications of their work and philosophers began to see these fields as fertile ground for the scrutiny of applied ethics" (O'Connell & Herkert, 2004, para. 51). Brian O'Connell and Joseph Herkert (2004) used the analogy of twins separated at birth when discussing engineering ethics and computer ethics. O'Connell and Herkert (2004) noted the degree of separation by using the lack of emphasis on computing ethics in engineering ethics education as factual support. Maturing in different environments, each field developed varied strengths and weaknesses. Engineering ethics has had a stronger grounding in professional practice and practicality than computer ethics, but "the field of computer ethics has done a much better job to date of integrating 'microethical' and 'macroethical' perspectives in research and education" (O'Connell & Herkert, 2004, para. 33).

Also of interest is the treatment of *computer ethics* by O'Connell and Herkert (2004). O'Connell and Herkert's discussion was

> directed to ethics as taught within or in conjunction with computer science and engineering departments, which is termed "traditional computing." This is due to reasons of economy. While management information science (MIS) and associated disciplines have generated significant ethical scholarship, they are excluded from present consideration as their orientation may reasonably be placed within the theoretically separate framework of business ethics. Software engineering is also developing a separate disciplinary status. (O'Connell & Herkert, 2004, endnote 1)

O'Connell and Herkert elected to not consider IS and SWE, due to the perceived orientation of the fields: SWE having a professional focus similar to engineering ethics, and IS being placed in the business framework. However, CS, computer engineering (CE), IT, IS, and SWE, whether perceived as traditional or contemporary, are all computing fields (Shackelford et al., 2006).

In a later but similar article, Herkert (2005) provided definitions of engineering ethics, highlighted a call similar to the call in computing education for more ethics education in engineering education, and suggested a closer integration of engineering ethics and computer ethics. Herkert re-emphasized that the two ethics are complimentary due to engineering ethics' strong professional sense, and computer ethics' social sense. Herkert also argued that engineering ethics education needed to be broadened to include macroethical perspectives (Herkert, 2005).

Louis Bucciarelli (2008) critiqued the typical way ethics is taught in engineering education, accreditation requirements for ethics, and codes of ethics. Bucciarelli (2008) argued for a more macro (fundamental) approach, in which the social aspects of design and decisions are emphasized and emphasis on the individual is lessened. The approach is more true to the reality of engineering practice. Bucciarelli (2008) recommended a major renovation of engineering education that opens the classroom to perspectives, changes the underlying value system, and integrates ethics as a more fundamental method of learning about the complexities of engineering practice. To not alter engineering education would be "'just about unethical'" (p. 148). Bucciarelli suggested that participants in a culture "share certain values and beliefs and abide by (mostly unwritten) norms about what contributes to, or denigrates, the public welfare, that these shared values define the integrity of the profession" (Bucciarelli, 2008, p. 146).

David Haws (2001) conducted a meta-analysis of 42 papers with content on the subject of ethics education in engineering. Haws (2001) identified six approaches to teaching ethics: professional codes, humanist readings, theoretical grounding, ethical heuristics, case studies, and service learning. As in computing education, professional codes and case studies receive the most attention, while theoretical grounding was one of the major weaknesses. Haws (2001) stated that engineers are convergent thinkers, yet ethical behavior requires divergent thinking, thus pinpointing where attention is needed in engineering education.

Another study related to ethics in engineering education was conducted by Michael Loui (2005). The primary questions of the study were as follows: Where do students learn professionalism? And what is the goal of ethics instruction in technical fields? The results indicated that, "students learn more professionalism primarily from relatives and co-workers who are engineers, and rarely from engineering courses" (Loui, 2005, p. 383). Even before an ethics course, students understand the importance of honesty and integrity. The study showed that the engineering ethics course did help students to "understand professional responsibility not only liability for blame but in a capacious sense as stewardship for society" (p. 383). The key is that students build self-confidence in moral reasoning.

Another field closely related to computing is nano-technology (NT). Nano-ethics is a growing research area, which has a dedicated journal *Nanoethics*. Robert McGinn (2008) conducted a study that sought NT researchers' attitudes toward and beliefs about ethics in relation to NT. McGinn (2008) noted the following with regard to macro-social ethical responsibility:

> The view of most respondents that there is more to being ethically responsible in the NT lab than adhering to lab safety rules was complemented by the finding that most respondents believe that NT researchers have (at least) two other ethical responsibilities: to anticipate ethical issues that may arise downstream from their upstream research work and, if the researcher has reason to believe that her or his work may be applied in society so as to create a significant risk of harm to human beings, to alert appropriate parties to the potential dangers. The fact that almost nine of ten NNIN researchers agreed that an individual in such a situation had such a responsibility indicates that NT may be one of the first technoscientific fields in which most researchers are unwilling to exempt

> themselves from what they see as macro-social ethical responsibilities (to anticipate and alert) normally assigned to downstream actors, like development engineers, manufacturers, politicians, regulators, and members of the public. (McGinn, 2008, p. 122)

The issue of responsibility avoidance has been a problem in computer ethics as well (Gotterbarn, 2001). Related to ethics education, McGinn (2008) noted,

> Most responding NT researchers reported having had little or no detailed ethics education related to their work. Not surprisingly, they did not feel particularly well informed about ethical issues related to their work. Nevertheless, encouragingly, a strong majority of respondents believed quite or very strongly that study of ethical issues related to science and technology should become a standard element of the education of future engineers and scientists. (p. 122)

So, though NT ethics education is lacking, the stakeholders seem open to pedagogic improvements.

Based on the study published in 2008, McGinn (2010) later published a guide to ethical responsibility for nanotechnologists. McGinn (2010) provided a definition of ethics, along with a description of the theoretical approach taken by McGinn. McGinn (2010) also stated that,

> As scientists and engineers probe new areas of inquiry that promise major social benefits but are also socially controversial, society needs and is beginning to demand researchers with a hybrid competence: state-of-the-art technical knowledge coupled with a sensitive ethical compass. (p. 12)

McGinn’s declaration is applicable to computing professionals and researchers as well.

Another contemporary ethics field related to computer ethics is that of game ethics. *The Ethics of Computer Games* by Miguel Sicart (2009) provided a comprehensive assessment of the field, which is part of a larger field called computer game studies. Sicart (2009) claimed that the theoretical framework offered is very close to that of Philip Brey's disclosive computer ethics, and that the turn from conventional discourse in computer games and ethics is that the framework is player-centric. Sicart's book addressed issues about the ethics of games, the ethics of playing games, and the ethical responsibilities of game designers. Sicart (2009) argued that computer games are ethical objects, computer game players are ethical agents, and the ethics of computer games should be seen as a complex network of responsibilities and moral duties. Sicart (2009) proposed a) a framework for analyzing the ethics of computer games, b) theoretical arguments and a general theory for understanding computer game ethics, and c) case studies examining games from an ethical perspective. The work included definitions of ethics and the game sub-field of applied computer ethics.

Related Studies

As illustrated by this review of the literature, researchers have not conducted studies specifically for the purpose of defining computing ethics, though scholars have said much theoretically and practically about computer ethics. Also, researchers have conducted studies that relate very closely to the purpose of this study. The researcher has communicated examples in the preceding sections and a couple more examples follow.

In 1985, when computer ethics and business ethics were being established as academic fields, Phillip Lewis (1985) conducted a study in an effort to define *business ethics*. The title of the paper was "Defining 'Business Ethics': Like Nailing Jello to a Wall." Lewis reviewed textbooks and articles, and also surveyed workers and executives. A content analysis of the sources and responses led to concepts, categorical groupings, and ultimately a definition of business ethics. Lewis (1985) found a likeness among the disparate definitions and presented the distilled definition: "*'business ethics' is moral rules, standards, codes, or principles which provide guidelines for right and truthful behavior in specific situations*" (p. 382). Lewis also provided definitions of the major concepts composing the definition: (1) rules, standards, codes or principles; (2) morally right behavior; (3) truthfulness; and (4) specific situations. In addition to the emergent concepts, Lewis (1985) presented 12 "bits and pieces" that could be used to define *business ethics*.

Another study by Thomas Hilton (2000) surveyed non-managerial IS practitioners in Fortune 500 companies. The purpose was to obtain answers to questions concerning the accuracy and reliability of computer ethics (also called information ethics by Hilton) in a business environment. The survey resulted in 191 usable responses, a 38% sample of the population of interest (Hilton, 2000). The first three survey questions and responses relate directly to this research study by suggesting that a definition of computer ethics and its dissemination are important to practitioners. Question 1 asked, "Should a company define computer ethics for employees?," to which 97% of the respondents answered "yes" (Hilton, 2000). Question 2 asked, "How should a company decide computer ethics?," to which 60% favor a consensual approach, while 36% favored a unilateral managerial decision, and 0% viewed ethics in such a context as a purely a personal matter (Hilton, 2000). Question 3 asked, "How well known are your company's ethics guidelines?," to which 43% answered "written and well known," 20% answered "unwritten but well known," and 35% answered "not well known or nonexistent" (Hilton, 2000). Hilton concluded the paper by suggesting that the study opened up future avenues for investigation. Hilton posed two important questions for future research: (a) "Is there a generally accepted definition of ethical computer use among information workers? If so, what is it?;" and (b) "Is information ethics viewed differently by different segments of the information systems industry? If so, how can significant differences be resolved?" (p. 283). This study can help in answering such questions.

CHAPTER 3: METHODOLOGY

> *When human atoms are knit into an organization in which they are used, not in their full right as responsible human beings, but as cogs and levers and rods, it matters little that their raw material is flesh and blood. What is used as an element in a machine, is in fact an element in the machine. Whether we entrust our decisions to machines of metal, or to those machines of flesh and blood…we shall never receive the right answers to our questions unless we ask the right questions.* (Wiener, 1954, pp. 185-186)

Methodology Overview

This chapter provides a detailed methodology of the study conducted to synthesize definitions of computer ethics in the computing community. Additionally, the study sought to determine the relationship between the synthesized framework and the ethical discourse of computing. The research study was rooted in the qualitative research paradigm. Methodology issues are discussed including the research questions, research design, artifacts, sampling and unitizing, coding, analysis plan, reliability and validity issues, and ethical issues.

Research Questions

This research considered the following research questions:

1. How does the computing community define *computer ethics* and synonymous terms?
2. What is the subject matter of journals with a computing ethics scope?
3. How does the definition derived from Question 1 relate to the subject matter derived from Question 2?

Disparity in the meaning of *computer ethics* throughout communities of discourse and practice has led to the need for Question 1. James Moor (2005) stated that, "Ethical theories themselves are often simplistic and do not give much guidance to particular situations" (p. 118). Therefore, the answer to Question 1 provides a structure by which ethics can be related to computing, and thus offers more guidance for computing educators and practitioners. Question 2 provides a view of ethical discourse in computing, while utilizing the framework derived from Question 1. The framework (definition) and subject matter could then be subjected to comparative analysis.

Research Design

The research paradigm this study exemplifies is qualitative interpretive research with elements of quantitative descriptive research. In interpretive research, the researcher "builds an extensive collection of *thick description*…as the basis for inductive generation of an understanding of what is going on…" (Locke, Silverman, & Spirduso, 2010, p. 184). Descriptive research "captures and displays a graphical picture of some aspect(s) of a situation – expressed in numbers" (Locke et al., 2010, p. 96). The research questions drove the research design as the researcher sought to describe and understand computing ethics.

The following steps denote the general process that the researcher followed while conducting this study. The researcher 1) considered the research problem within the context of the models and theoretical frameworks presented in the literature review; 2) collected data through artifact sampling and unitizing; 3) analyzed the data inferentially and statistically through a process that identified themes; 4) presented conclusions in relation to the existing literature (adapted from Krippendorff, 2012, p. 84; Locke et al., 2010, p. 186).

The primary component of this research design was a content (thematic) analysis of artifacts. Content analysis is a method for interpreting meaning in discourse (O'Leary, 2010). Also, content analysis is particularly useful for classifying information in textual artifacts (Nardi, 2005). As a formal research method, content analysis has existed since the 1950's, though its intellectual roots are much older (Krippendorff, 2012). “Conventional content analysis is generally used with a study design whose aim is to describe a phenomenon,” in this case computing ethics (Hsieh & Shannon, 2005, p. 1279). Scholars have established precedent for content analysis studies in numerous fields of both the qualitative and quantitative traditions (Berg & Lune, 2011; Elo & Kyngäs, 2008; Hsieh & Shannon, 2005; Krippendorff, 2012; Stemler, 2001; Wesley, 2009; White & Marsh, 2006; Zhang & Wildemuth, 2009). This flexible research method allowed for a duality of thematic and statistical analysis.

The preceding works cited (in this section) discuss conceptual and epistemological foundations of content analysis, and connect seminal works in the field. Table 2 provides an applied perspective of content analysis studies similar to the approach used or purpose intended in this study.

Table 2: Content Analysis Studies

Study Author(s)	**Title**	**Purpose**	**Artifacts**
(Lewis, 1985)	Defining ‘Business Ethics’: Like Nailing Jello to a Wall	To synthesize a definition of ‘business ethics’ that is broad enough to cover the field of management	158 books 50 articles 185 surveys
(Dahlsrud, 2008)	How Corporate Social Responsibility is Defined: An Analysis of 37 Definitions	To study how corporate social responsibility is defined in existing definitions	37 articles and web pages
(Baregheh, Rowley, & Sambrook, 2009)	Towards a Multidisciplinary Definition of Innovation	To further develop understanding of the concept of innovation and to arrive at an integrative definition	60 books and articles
(Harris, 2001)	Content Analysis of Secondary Data: A Study of Courage in Managerial Decision Making	To explore the use of secondary data as a source for empirical studies in applied ethics; To explore the meaning of “courage”	60 newspaper items in pilot study 610 newspaper items in full study

Study Author(s)	Title	Purpose	Artifacts
(Castaldo, Premazzi, & Zerbini, 2010)	The Meaning(s) of Trust: A Content Analysis on the Diverse Conceptualizations of Trust in Scholarly Research on Business Relationships	To explore the diversity and nature of trust conceptualizations across different studies; To derive a stable pattern of conceptual development and at identifying its key building blocks from this exploration	96 articles
(Farrell & Cobbin, 1996)	A Content Analysis of Codes of Ethics in Australian Enterprises	To determine the level of ethical content in the codes of ethics, and the purpose of the codes' design	95 codes of ethics
(Farrell & Cobbin, 2000)	A Content Analysis of Codes of Ethics from Fifty-Seven National Accounting Organisations	To ascertain the basic features of the codes; To identify and compare ethical concerns; To determine the mix of types of codes	57 codes of ethics
(Todd, McKeen, & Gallupe, 1995)	The Evolution of IS Job Skills: A Content Analysis of IS Job Advertisements from 1970 to 1990	To determine the degree to which changes in IS job ads matches the perception of knowledge and skills needed; To increase understanding of the IS profession	1,234 newspaper job ads
(Fennell, 2001)	A Content Analysis of Ecotourism Definitions	To better understand the concept of ecotourism; To provide an empirical basis from which to further discussion on the topic	85 definitions (sources varied)

Artifacts

The artifacts examined for this research study included the following:

1. Definitions taken from primary and secondary texts (i.e., articles, books) related to computing ethics
2. Journal articles published in journals with an ethics and computing scope
    a. ACM Computers and Society (ISSN: 0095-2737)
    b. IEEE Technology and Society Magazine (ISSN: 0278-0097)
    c. Ethics and Information Technology (ISSN: 1388-1957)

d. Journal of Information, Communication, and Ethics in Society (ISSN: 1477-996X)

The researcher gathered the definitions through a review of the literature. The researcher collected journal article data from online databases. The researcher stored, organized, and maintained all the data digitally.

José Ortega y Gasset (2000) has discussed analogies for viewing "Aspects and the Entirety" (p. 38). To gain understanding, or knowledge (a perspective), of what computer ethics *is*, *it*s aspects must be set before mankind. An "aspect" is a perspective from the viewpoint of the thing, and a "view" is a perspective from the viewpoint of mankind (Ortega y Gasset, 2000). Computer ethics offers aspects (artifacts), "to state it crudely…piece[s] of the thing" (Ortega y Gasset, 2000, p. 41). This research offers views of the artifacts, "an 'interpretation' of the thing itself" (p. 44). Collectively, the artifacts offer input from two stances (Figure 1).

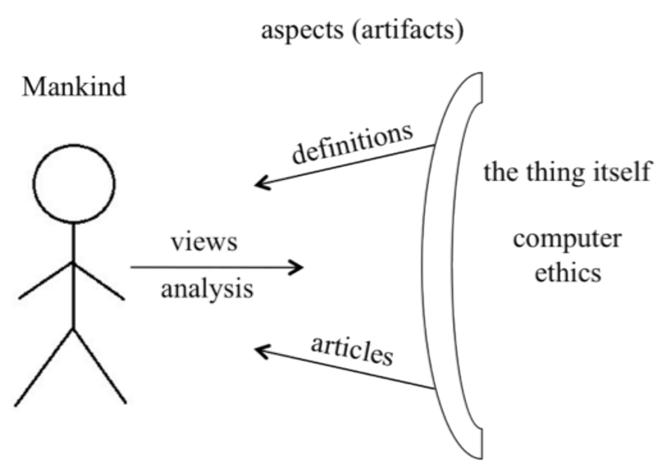

Figure 1: Aspects and Views of Computer Ethics

Sampling and Unitizing

An important component of content analysis is the *objects of observation*. The objects of this research study were definitions and journal article data. The researcher did not approach the collection of computer ethics definitions as a sampling exercise, but rather attempted to assemble a comprehensive collection of *explicit* definitions existing in the literature. The researcher reviewed publications including books, anthologies, journal articles, conference proceedings, codes of ethics, computing curricula models, and other writings related to computing ethics. The researcher gave no preference to any fields or perspectives. The researcher sought out as many definitions as possible regardless of the stance of the author(s). The researcher searched publications electronically and manually.

The researcher used a sampling approach in the case of the journal articles. The study included four journals with a computing and ethics scope as data sources. The study did not include disparate articles on ethics and computing published in journals where ethics was not a primary component of the journal scope. *IEEE Technology and Society Magazine* began publication in 1982, *Ethics and Information Technology* in 1999, *ACM Computers and Society* in 1972, and the *Journal of Information, Communication, and Ethics in Society* in 2003. The study excluded editorials without titles, commentaries, reviews, introductions without titles, book excerpts, bibliographies, interviews, and comment pieces from the sample. From the journals' beginning dates to 2012, and given the exclusions, the four journals published a total of 1,745 articles. The sample limits for the journal data were complete volumes published within five years of the research study, meaning 2009 – 2012. The study did not include articles published in 2013 since the volumes remained incomplete at the time of data collection. From 2009 to 2012, the four journals published a total of 346 articles, a sample size of approximately 20%.

Another important component of content analysis is *units of observation or analysis* (Wesley, 2009; Zhang & Wildemuth, 2009). The researcher unitized by themes and linguistic properties when conducting this study. For Research Question 1, the researcher broke down the definitions by phrases and words for qualitative coding. The unit of analysis for the journal articles was the article title. For Research Question 2, the researcher broke down the titles by themes, phrases, and words for qualitative coding. The researcher, via software, also unitized both data sets by words to conduct a quantitative frequency analysis for comparison.

Coding Methods

The researcher used coding methods including attribute coding, in vivo coding, and descriptive coding to conduct this study. Attribute coding is a "grammatical" method that "logs essential information about the data" (Saldaña, 2013, p. 69). Attribute codes are meta-data. The researcher conducted attribute coding on all artifacts for organization and comparative purposes. In Vivo coding is an "elemental" method that "draws from the [artifact's] own language for codes" (p. 84). Descriptive coding is another elemental method that "assigns basic labels to data to provide an inventory of their topics" (Saldaña, 2013, p. 83). The researcher employed In Vivo and Descriptive coding in the analysis of all the artifacts. The elemental coding of the definitions and titles resulted in codebooks. The researcher then distilled the definition codebook into patterns and themes leading to a taxonomy and definition of *computing ethics*. The researcher then used the definition themes for comparative analysis with the subject matter themes.

Analysis Plan

This study involved the use of four software applications to analyze and visualize the data. The data included a) definitions from articles and books examined during the literature review, and b) article data from journals with an ethics and computing scope. The researcher imported all data into Dedoose (www.dedoose.com), a web-based software package designed specifically for qualitative and mixed-methods research. The researcher also analyzed the data using WordSnapper, a custom software application written by the researcher for statistical and frequency analysis. Another web-based tool, MindMup (www.mindmup.com), enabled the creation of mind map visualizations. The researcher also used Microsoft Excel to assist with organization and visualization of the data.

The “need for ongoing rich engagement” with the data is of crucial importance when conducting data analysis (O’Leary, 2010, p. 262). In general, qualitative or mixed-method analysis involves 1) organizing and entering the raw data; 2) identifying biases and noting overall impressions; 3) reducing and coding the data; 4) searching for patterns, interconnections, and meaning; 5) mapping and building themes; 6) interpreting meaning and verifying theories; and 7) drawing conclusions (O’Leary, 2010, pp. 257, 262). The reduction phase for the definitions was a two-step process: 1) decompose each narrative definition into a hierarchy of phrases, and 2) merge the hierarchies into a taxonomy, while eliminating overlap. Another note is that the overall analysis process is meant to be iterative, and thus this analysis was cyclical.

The researcher followed the outlined analysis plan for the definitions and journal article titles, but more specifically followed a process similar to that discussed in (Hsieh & Shannon, 2005). After data collection,

> data are read word by word to derive codes…by first highlighting the exact words from the text that appear to capture key thoughts or concepts. Next, the researcher approaches the text by making notes of his or her first impressions, thoughts, and initial analysis. As this process continues labels for codes emerge that are reflective of more than one key thought. These often come directly from the text and then become the initial coding scheme. Codes are then sorted into categories based on how different codes are related and linked. These emergent categories are used to organize and group codes into meaningful clusters…(Hsieh & Shannon, 2005, p. 1279)

The emergent categories from the definitions composed the synthesized definition. The categories also served as the organization template for the codes that emerged from coding the journal article titles. The researcher could then analyze similarities and differences between the definition and subject matter.

The analysis plan involved the use of WordSnapper, a C++ command-line software application written by the researcher for frequency analysis. The researcher chose to create the custom frequency analysis software because a) of the ability to control the application interface and behavior, b) of the ability to control the algorithmic analysis of characters and words, c) the approach provided a more cost-effective and usable software solution for the task, and d) the approach added a technical computing component relative to the researcher's background. The researcher used WordSnapper to analyze the definition taxonomy (RQ1) and the journal article data (RQ2). The quantitative results were helpful in two ways: 1) to give the researcher an initial impression of the data, and terminology to *watch for* prior to conducting the qualitative analysis; and 2) to provide a means of verifying that the codes, patterns, and themes derived from the qualitative analysis did not venture far from the terminology and emphasis of the raw data.

Overall, the analysis included managing of resources, descriptive analysis based on a quantization of data, excerpting, unitizing, coding, filtering, themeing, multi-level descriptor analysis, and data visualization. The use of Dedoose, WordSnapper, MindMup, and Excel to conduct the thematic and statistical analysis of the mixed data allowed the researcher to explore and present the complexity of computer ethics. Further details on the analysis process, results, and interpretations are presented in Chapters 4 and 5.

Validity, Reliability, and Errors

This study involved internal and external readers, coding verification, software quality assurance, and a graduate committee. The committee and readers reviewed the study procedures, while various sources within the research literature confirmed the study procedures. The researcher maintained the data in its entirety and appropriately used the data to illustrate the essence of ethics in computing. Computing community worldviews, along with study limitations and delimitations, are discussed in Chapter 5.

Validity and *reliability* have different meanings in quantitative and qualitative research. Generally, validity is concerned with "whether the research has been designed so that it truly deals with what is being examined" and "whether or not the results will remain truthful when subsequently applied…" (Locke et al., 2010, p. 81). The concerns are often referred to as internal and external validity, respectively. In general, reliability is concerned with consistent methods of data collection and analysis (Locke et al., 2010; O'Leary, 2010). Since the design of this study is qualitatively driven, this section addresses validity and reliability with respect to the qualitative research paradigm.

Text artifacts and the data therein are qualitative in nature (even when quantified), relying on interpretation of the reader. In qualitative fields, scholars often replace validity and reliability with synonymous terms such as credibility, authenticity, dependability, confirmability, and integrity (Creswell, 2006; O'Leary, 2010). Evaluation also takes on a different tone: a) Do the research questions drive the data collection? b) Are the collection and analysis techniques competently applied? c) Are the researcher's assumptions made explicit? d) Is the study robust and includes theoretical explanations? and e) Does the study add value (Creswell, 2006)? Though differences exist when compared to quantitative methods, the goals are the same: "Has 'true essence' been captured" and "are methods approached with consistency" (O'Leary, 2010, p. 43)?

This research study included various strategies that gave attention to essence and rigor. The methods of verification followed in this research study correspond to those posited by Morse, Barrett, Mayan, Olson, and Spiers (2002). Morse et al. (2002) argued that, "strategies for ensuring rigor must be built into the qualitative research process per se" (p. 17). Furthermore,

> Within the conduct of inquiry itself, verification strategies that ensure both reliability and validity of data are activities such as ensuring methodological coherence, sampling sufficiency, developing a dynamic relationship between sampling, data collection and analysis, thinking theoretically, and theory development. (Morse et al., 2002, p. 18)

The following list gives a brief description of each strategy and a description of the researcher's adherence.

- *Methodological Coherence*
  - Ensures "congruence between the research question and the components of the method. The interdependence of qualitative research demands that the question match the method, which matches the data and the analytic procedures" (Morse et al., 2002, p. 18).
  - This study was iterative, not linear. Data demanded that the questions and methods be modified periodically. Sampling plans changed course as the study progressed. Through iteration, the questions, methods, and data became coherent.
- *Appropriate Sample*
  - Ensures "efficient and effective saturation of categories, with optimal quality data and minimum dross" (Morse et al., 2002, p. 18).

  - The researcher sought out all explicit definitions of computer ethics, and the collection contained the prominent definitions in the literature. For the journal articles, the population was 1,745 and the sample size was 346. In quantitative terms, the sample size would satisfy the minimum sample size required (315), given a confidence level of 95% and a confidence interval of ±5. The confidence interval given the actual sample size is 4.72. Qualitatively, the researcher gathered sufficient data to account for the broad aspects of the phenomenon. Also, saturation occurred with respect to both research questions, which the researcher verified via test cases and comparative analysis.

- *Concurrent Data Collection and Analysis*
  - Forms “a mutual interaction between what is known and what one needs to know” (Morse et al., 2002, p. 18).
  - This study was iterative. Therefore, data collection and analysis were simultaneous activities that progressively informed one another. Concurrence “is the essence of attaining reliability and validity” (p. 18).
- *Thinking Theoretically*
  - Requires “macro-micro perspectives, inching forward without making cognitive leaps, constantly checking and rechecking, and building a solid foundation” (Morse et al., 2002, p. 18).
  - The researcher confirmed the ideas emerging from the data with new data and verified the themes with data already collected. For example, the researcher re-confirmed the synthesized definition by comparison with newfound definitions, existing definitions, and research data.

- *Theory Development*
  - Moves "with deliberation between a micro perspective of the data and a macro conceptual/theoretical understanding" (Morse et al., 2002, p.18).
  - The researcher started with a micro view of the data (quantitatively and qualitatively) and progressed to a macro view. Thus, the results of the study are an outcome of the research process. The results provide a theoretical template for comparison and further development.

According to (Morse et al., 2002),

> Together, all of these verification strategies incrementally and interactively contribute to and build reliability and validity, thus ensuring rigor. Thus, the rigor of qualitative inquiry should thus be beyond question, beyond challenge, and provide pragmatic scientific evidence that must be integrated into our developing knowledge base. (p. 19)

The researcher strictly adhered to the outlined strategies in order to minimize errors.

The researcher also conducted reliability and validity (software quality assurance) testing of the custom software WordSnapper using test data and study data. Throughout the development of the application, the combined codes of ethics of ABET, ACM, AIS, AITP, IEEE, and SWE served as the primary test data set. The complete catalogue (beginning year to 2013) of article title data from the four journals used in this study served as a test data set. The definition taxonomy also served as a data set for testing. The researcher tested WordSnapper word counts against two common word counters: *wc* on Linux and Microsoft's *Word Count*. Throughout the iterative coding/testing process, the researcher programmed WordSnapper to handle the character issues within the three data sets, while concurrently cleaning the data sets. The primary difference between WordSnapper and the other counters is that wc and Word Count define words based on the *white space* separating words while WordSnapper defines words based on the nature (ASCIIness) of characters.

The primary issue with counting words in large data sets based on ASCIIness is the handling of characters outside of the standard 7-bit ASCII range of 0 – 127. For example, in the journal data set, article titles may contain apostrophes, hyphens, quotes, and accented characters outside the standard range. Also, issues such as the handling of capitalization ("Internet" and "internet"), hyphenated words (e.g., e-trust), punctuation (e.g., U.S.A.), and the use of special characters instead of words (e.g., & and /), exist. Other anomalies can cause issues with a word count, like an ellipse (…) counts as a word in wc and Word Count, but not in WordSnapper. The iterative testing process followed the following procedure: 1) run word counts with WordSnapper, wc, and MS Word Count; 2) search for characters causing disparate counts; 3) modify WordSnapper to handle character issues; 4) clean/modify data set if necessary; 5) return to step 1. Table 3 illustrates the comparative word counts at the final stage of WordSnapper development and establishes a level of validity and reliability for WordSnapper.

Table 3: Word Count Testing

Data Set (Journals, Codes, Taxonomy)	**WordSnapper**	**wc (Linux)**	**MS Word**
Computers and Society	4,601	4,603	4,602
Ethics and IT	3,325	3,325	3,325
ICES	2,115	2,115	2,115
Technology and Society	4,845	4,844	4,844
ABET	2,868	2,876	2,867
ACM	3,096	3,093	3,093
AIS	3,557	3,556	3,556
AITP	767	767	767
IEEE	258	258	258
SWE	2,446	2,446	2,446
Combined Codes	12,992	12,996	12,967
Definition Taxonomy	2,047	2,047	2,047

Another important consideration is external validity. As stated previously in this section, external validity is concerned with the generalizability of results. In a qualitative sense this may be referred to as transferability (O'Leary, 2010). This study was inclusive of disciplines and discourses related to computing ethics, with no discrimination based on artifact characteristics. Due to the inclusive design, the study avoided coverage error. The study also provides transferable insight and lessons learned for further study in computing ethics or related fields. As for verification of results, the researcher has fully explicated the methods, so the conclusions are understandable and reproducible.

Ethical Issues

Research has the potential to present ethical dilemmas. Ethical issues are a primary concern, particularly throughout a study of ethics. The Belmont Report (1979) established basic ethical principles and applications for research involving human subjects. Though this research did not involve human subjects directly, the following ethical principles guided this study: a) Respect for persons – the researcher equally respected the artifact authors and their views; b) Beneficence – the researcher intended no harm by this study, and the researcher sought to maximize possible benefits to the computing community; and c) Justice – this study has been made freely available to all in an effort to ensure fairness in distribution.

CHAPTER 4: DATA ANALYSIS

> *It is not enough that you should understand about applied science in order that your work may increase man's blessings. Concern for the man himself and his fate must always form the chief interest of all technical endeavors…that the creations of our mind shall be a blessing and not a curse to mankind. Never forget this…* (Einstein, 1931)

Data Analysis Overview

This chapter presents the results of the content analysis conducted to define computing ethics and to determine the subject matter of ethics and computing. Additionally, the analysis explored the relationship between the definition and the subject matter of computing ethics. Analysis processes, results, and interpretations are discussed including the empirical importance of definition, defining computing ethics, the subject matter of computing ethics, and the comparative analysis of the definition and subject matter. General data analysis issues are discussed throughout.

Empirical Importance of Definition

Definition is of value, and vital, in any area of study. "Chapter 1: Introduction" and "Chapter 2: Literature Review" both discussed the importance of definition. The researcher desired to establish an empirical foundation for the importance of definition in computing ethics before conducting the primary data analysis. The task was meant to consider *definition* within the context of the theoretical frameworks presented in the literature review. For the exercise, the researcher performed a search on an artifact relevant to the study: *The Handbook of Information and Computer Ethics* edited by Himma and Tavani (2008).

The researcher searched for the term *defin** where the asterisk (*) indicates a wildcard continuation of the word. The approach helped account for possible endings: define, defines, defined, defining, definition, and so on. Pages containing terms such as *high-definition* and *indefinitely* were excluded from the results. In total, 153 out of 705 pages discuss definition in some respect. The 705 page count is inclusive of all pages, beginning to end, including the introduction sections (e.g., table of contents, preface, etc.), concluding sections (e.g., references, index, etc.), and blank dividing pages. Thus, approximately 20-25% of the pages in *The Handbook* (Himma & Tavani, 2008) contain explicit *defin*ition sentiments. The brief analysis did not account for statements such as "computer ethics is…" (i.e., term X *is* description Y), which would likely increase the number of definition sentiments.

The search found a total of 106 definitions via the explicit use of *defin** terminology. Table 4 provides the list of terms and concepts defined or considered in *The Handbook of Information and Computer Ethics* (Himma & Tavani, 2008). The results suggest that definition is important and encouraged in the field of computer and information ethics. The assessment also revealed that minimal overlap of concepts occurs throughout *The Handbook*. The defined terms give an unintentional but preliminary conceptual overview of the field of computing ethics.

In the *The Handbook* "Foreword," Deborah Johnson stated, "the volume defines the field as a whole; it identifies foundational issues, provides theoretical perspectives, and includes analyses of a range of applied and practical issues" (Himma & Tavani, 2008, p. xi). In *The Handbook* "Preface," the editors stated that, "Handbook readers will gain an understanding of both the general frameworks and specific issues that define the fields of information and computer ethics" (p. xiv). The editors then stated in the "Introduction," "We believe that the 27 chapters comprising The Handbook of Information and Computer Ethics address most of the rich and diverse issues that arise in and, in effect, define the field of information/computer ethics" (p. xxxi).

Table 4: Definitions in *The Handbook of Information and Computer Ethics*

information and computer ethics	public goods	audit
Information-as-Target Ethics	Internet research ethics (IRE)	Internet governance
Land Ethics	human happiness	obscene
moral agent	confidentiality	information overload
infosphere	distinctive cultures	load
commendable action	ethical problems	spam
computer ethics	business	email spam
informational objects	stakeholders	illegal spam
particularism	globalization	a good-to-bad continuum
value	corporate social responsibility	plagiarism
trust	quality	deception
intellectual property	functionality of information	ghostwriting
ourselves	significance of information	copyright infringement
privacy	virtual reality	fair use
physical privacy	virtual world/environment	peer-to-peer (P2P) network
decisional privacy	simulator	inducement of infringement
informational privacy	simulations	censorship
personal data	virtual	interest in expression
privacy-enhancing technologies (PETs)	physical entities	lying
anonymity	institutional entities	shades of ethicality
hacktivism	reality	judgment
digital activism	immoral behaviors	women
infringed	genetic information	humanity
professions	life	playfulness
information	computational elements	severe poverty
intellectual freedom	aggression	the capital divide
indexing and retrieval	context (in terms of risk analysis)	the treatment divide
open source software	system quality	the digital divide
free software	developer and stakeholder rights	Intercultural Information Ethics (IIE)
software freedom	project tasks	information access
informed consent	clusters	culture
human values: welfare, ownership and property, privacy, freedom from bias, universal usability, trust, autonomy, informed consent, accountability, courtesy, identity, calmness, environmental sustainability		

Defining Computing Ethics

Research Question 1: How does the computing community define *computer ethics* and synonymous terms?

Scholars have credited Norbert Wiener for establishing the foundation of computer ethics, but scholars have not traditionally credited Wiener with a definition of the field. However, at the beginning of "Chapter IX" in *The Human Use of Human Beings*, Wiener stated, "I shall discuss that field in which the communicative characters of man and of the machine impinge upon one another, and I shall try to ascertain what the direction of the development of the machine will be, and what we may expect of its impact on human society" (p. 136). Wiener referred to the "impact" under study as "The Second Industrial Revolution" (p. 136). Wiener (1954) also went on to raise questions such as, "What can we expect of [automatization's] economic and social consequences?" (p. 161). Wiener's use of "field" in the first statement seems not directed at a field of study per se, but rather the sphere in which man and machine meet, which Wiener goes on to describe with examples. However, this statement provides a point of departure for the definition of a field of study, and a potential definition of the field as envisioned by Wiener. Wiener's concept provided a test case for the definition derived in this study.

Definition Collection

Through a thorough review of sources including books, anthologies, journal articles, conference proceedings, codes of ethics, computing curricula models, and other writings related to computing and ethics, the researcher collected 30 *explicit* definitions of *computer ethics* and synonymous terms. The definitions originated from 23 authors and were authored from 1978 to 2013. A majority of the definitions were authored post–2000. The 30 definitions represent a comprehensive collection of the explicit definitions that exist in the literature reviewed. The researcher does not suggest that the definitions collected are the only definitions, but that the collection is comprised of a substantial portion of definitions in existence at the time of the study. The researcher found a 31st definition after data collection and analysis, which provided another test case for the synthesized definition.

When a definition was found, the researcher entered the definition into a plain text file, along with author(s) name(s), date, and publication information. The researcher collected and organized the definitions digitally as separate files within a folder. After concluding the collection phase, the researcher combined the definitions into a single text file organized by author, date, and terminology. APPENDIX A presents the definitions in their entirety.

Meta-data Analysis

As shown in Table 5, authors with multiple definitions include Bynum with four, Floridi with four, Johnson with two, and Moor with two. Years with the most definitions were 2009 and 2010, both with three per year. The term *computer ethics* is used exclusively or inclusively in 25 of the 30 definitions.

Table 5: Definitions of *Computer Ethics* and Synonymous Terms

Author(s) and Date	**Artifact Title**	**Terminology**
(Maner, 1980, org. 1978)	Starter Kit On Teaching Computer Ethics	computer ethics
(Johnson, 1985)	Computer Ethics	computer ethics
(Moor, 1985)	What Is Computer Ethics?	computer ethics
(Gotterbarn, 1991)	Computer Ethics: Responsibility Regained	computer ethics, professional computer ethics
(Bynum, 1992)	Computer Ethics in the Computer Science Curriculum	computer ethics
(Pierce & Henry, 1996)	Computer Ethics: The Role of Personal, Informal, and Formal Codes	computer ethics
(Moor, 1998)	Reason, Relativity, and Responsibility in Computer Ethics	computer ethics

Author(s) and Date	Artifact Title	Terminology
(Floridi, 1999)	Information Ethics: On the Philosophical Foundation of Computer Ethics	computer ethics
(Bowyer, 2000)	Ethics and Computing: Living Responsibly in a Computerized World	ethics and computing, professional ethics
(Brey, 2000b)	Method in Computer Ethics: Towards A Multi-level Interdisciplinary Approach	computer ethics
(Bynum, 2001a)	Computer Ethics: Basic Concepts and Historical Overview	computer ethics
(Floridi & Sanders, 2002)	Mapping the Foundational Debate in Computer Ethics	computer ethics and information ethics
(Marturano, 2002)	The Role of Metaethics and the Future of Computer Ethics	computer ethics
(Bynum & Rogerson, 2003): Bynum	Computer Ethics and Professional Responsibility	computer ethics
(Shackelford et al., 2006)	Computing Curricula 2005: The Overview Report	Legal/Professional/ Ethics/Society
(De George, 2006)	Information Technology, Globalization and Ethics	computer ethics and business ethics
(Górniak-Kocikowska, 2007)	From Computer Ethics to the Ethics of Global ICT Society	global ICT ethics, computer ethics, ICT ethics
(Stamatellos, 2007)	Computer ethics: A global perspective	computer ethics
(Barger, 2008)	Computer Ethics: A case-based approach	computer ethics
(Van den Hoven, 2008)	Moral Methodology in Information Technology	computer ethics
(Floridi, 2009)	Network Ethics: Information and Business Ethics in a Networked Society	computer ethics
(Johnson, 2009)	Computer Ethics	computer ethics, IT ethics, sociotechnical IT ethics
(Sicart, 2009)	The Ethics of Computer Games	computer ethics
(Floridi, 2010)	The Cambridge Handbook of Information and Computer Ethics	information and computer ethics
(Luppicini, 2010)	Technoethics and the Evolving Knowledge Society: Ethical Issues in Technological Design, Research, Development, and Innovation	computer and engineering technoethics, information and communication technoethics
(O'Brien & Marakas, 2010)	Introduction to Information Systems	Business/IT security, Ethics, Society; Technology ethics
(Bynum, 2011)	Computer and Information Ethics	computer and information ethics
(Baase, 2012)	A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology	computer ethics, professional ethics

Author(s) and Date	Artifact Title	Terminology
(Tavani, 2012)	Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing	cyberethics
(Valacich & Schneider, 2013)	Information Systems Today: Managing in the Digital World	computer ethics

Table 6 presents the artifact type, home discipline of the author(s), and the publication source for each of the definitions.

Table 6: Definition Meta-Data

Author(s) and Date	Artifact Type	Discipline[a]	Source/Publisher
(Maner, 1980, org. 1978)	Curricula	Computer Science	Self, Helvetia Press
(Johnson, 1985)	Book	Philosophy, STS	Prentice Hall
(Moor, 1985)	Journal article	Philosophy	Metaphilosophy
(Gotterbarn, 1991)	Journal article	Philosophy, Computer Science	The Phi Beta Kappa Journal
(Bynum, 1992)	Book section	Philosophy	Teaching Computer Ethics; Southern Connecticut State University
(Pierce & Henry, 1996)	Journal article	Computer Science, Business	Journal of Business Ethics
(Moor, 1998)	Journal article	Philosophy	Computers and Society
(Floridi, 1999)	Journal article	Philosophy	Ethics and Information Technology
(Bowyer, 2000)	Book	Computer Science	Wiley-IEEE Press
(Brey, 2000b)	Journal article	Philosophy	Ethics and Information Technology
(Bynum, 2001a)	Encyclopedia entry	Philosophy	The Stanford Encyclopedia of Philosophy
(Floridi & Sanders, 2002)	Journal article	Philosophy	Ethics and Information Technology
(Marturano, 2002)	Journal article	Philosophy	Ethics and Information Technology
(Bynum & Rogerson, 2003): Bynum	Book	Philosophy	Wiley-Blackwell
(Shackelford et al., 2006)	Curricula	Computing	ACM, AIS, IEEE-CS
(De George, 2006)	Journal article	Philosophy	Ethics and Information Technology
(Górniak-Kocikowska, 2007)	Journal article	Philosophy	Library Hi Tech

Author(s) and Date	Artifact Type	Discipline[a]	Source/Publisher
(Stamatellos, 2007)	Book	Philosophy	Jones & Bartlett Publishers
(Barger, 2008)	Book	Education, Philosophy	Cambridge University Press
(Van den Hoven, 2008)	Book section	Philosophy	The handbook of information and computer ethics; Wiley-Interscience
(Floridi, 2009)	Journal article	Philosophy	Journal of Business Ethics
(Johnson, 2009)	Book	Philosophy, STS	Pearson
(Sicart, 2009)	Book	Game Studies	MIT Press
(Floridi, 2010)	Book	Philosophy	Cambridge University Press
(Luppicini, 2010)	Book	Educational Technology	Information Science Reference
(O'Brien & Marakas, 2010)	Book	Information Systems	McGraw-Hill Irwin
(Bynum, 2011)	Encyclopedia entry	Philosophy	The Stanford Encyclopedia of Philosophy
(Baase, 2012)	Book	Computer Science	Prentice Hall
(Tavani, 2012)	Book	Philosophy	Wiley
(Valacich & Schneider, 2013)	Book	Information Systems	Prentice Hall

[a]Discipline is based on primary field(s) of the author(s).

The source with the most definitions was the journal *Ethics and Information Technology* with five definitions. Most definitions, 21, originate partially or exclusively from within the field of philosophy, while eight definitions partially or exclusively originate from within a formal computing field (Table 7). A majority of the definitions, 26 of 30, were published in a journal article or book/book section (Table 8).

Table 7: Definitions by Field

Education, Philosophy	1
Philosophy	17
Philosophy, STS	2
Philosophy, Computer Science	1
Computer Science	3
Computer Science, Business	1
Computing	1
Information Systems	2
Educational Technology	1
Game Studies	1

Table 8: Definitions by Artifact Type

Journal article	11
Book	13
Book section	2
Curricula	2
Encyclopedia entry	2

Initial Issues and Impressions

During the definition data collection and organization process, the researcher noted initial issues and impressions.

- Finding *explicit* definitions of *computer ethics* and synonymous terms proved to be a challenge due to the reluctance of authors to explicitly and uniquely define the concept.
- Bynum stated in (2001a) that Moor's definition of computer ethics was the best available.
- Some sources rely solely on the definition of another author and do not present a unique definition. For example, Edgar's *Morality and Machines* (2002) and Kizza's *Ethical and Social Issues in the Information Age* (2013) both rely on Moor's (1985) definition.
- Moor (1985) used the phrase "computer ethics is…," which contributes to the definition's prominence and other authors' reliance on the definition. Other authors seem reluctant to be as explicit when defining computer ethics.
- Some prominent books do not present an explicit definition, such as (Reynolds, 2011), (Spinello, 2010), and (Quinn, 2012).
- Writers regularly used the terms *narrow* or *broad* in connection with the definitions.
- None of the definitions discussed the notions of *right* or *wrong*.

- An aspect that seems to be missing from the definitions is that ethics should include the development of moral reasoning, not just study, analysis, etc. of computing technology (see Dark & Winstead, 2005).
- In some cases, such as (Floridi, 1999), the definition takes on characteristics of what the author *perceives* computer ethics to be (typically via the literature) and characteristics of what the author believes computer ethics *should be*.
- With regard to (Floridi, 1999) v. (Floridi & Sanders, 2002), computer ethics (CE) and information ethics (IE) are sometimes used interchangeably in (1999), which blurs the distinction between the two *ethics*. Term alternating happens less in (2002). In (1999), Floridi mentions explicitly that CE is infocentric, but in (2002) Floridi & Sanders instead state IE as infocentric. To Floridi (and Sanders), both are *the same* in the infocentric sense, just with one being the foundation of the other. The distinction between CE and IE is more apparent in (2002).
- Publications regarding large projects such as the ImpactCS project funded by NSF use the term *define* many times, but in reference to defining the content of ethics in computing (education specifically), not computer ethics. The ImpactCS approach is similar to the approach of the various computing association codes of ethics.
- An issue with synthesizing a definition is that authors differ on the stance/orientation of computer ethics. Characteristics of the definitions can change when viewed from different stances of what computer ethics is considered *to be*. What emerged was a latent hierarchy, which deserves attention in future research. Apart from the definitions, the hierarchy is a *meta-stance* (Figure 2) of computer ethics:

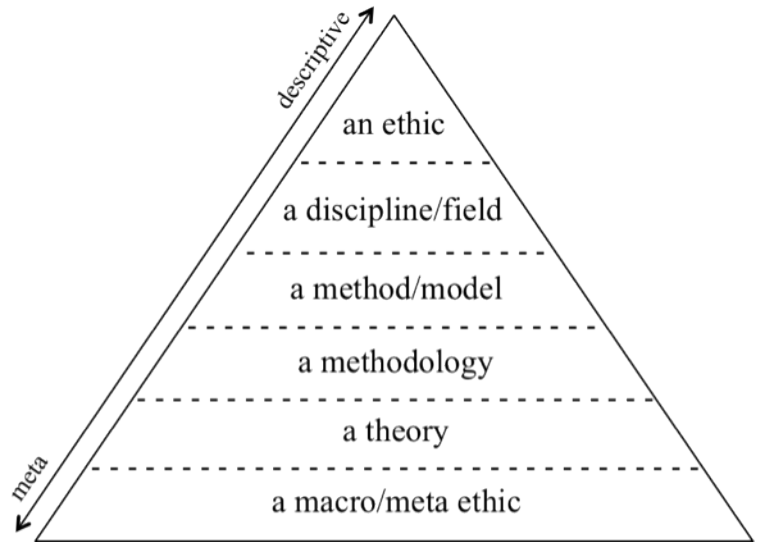

Figure 2: Meta-Stance of Computer Ethics

- *An ethic* – The stance is descriptive with applied features. Such a stance is what a social group believes is right related to computing technology. For example, a particular computing code of ethics or a standard of action.
- *A discipline/field* – The stance is applied. Such a stance includes a classification/name and task. The stance posits a topical area or approach to ethics study, which consists of a task in the sense that [name] (e.g., computing ethics) is the study of morality and computing.
- *A method/model* – The stance is applied with normative features. Such a stance suggests a process for *doing* computing ethics, meaning a specific process for practicing ethics (e.g., the standard model, disclosive, discourse).
- *A methodology* – The stance is normative. Such a stance adheres to a system of processes in the study of computing ethics, meaning a system of evaluating moral and ethical objects/situations (e.g., what ought to be right).

- *A theory* – The stance is normative with meta features. Such a stance espouses an approach to or standards of ethical justification in computing. For example, an ethical perspective such as Utilitarianism, Deontology, etc.
- *A macro/meta ethic* – The stance is meta in nature. Such a stance is a study of the nature of computing ethics and the grounds for its study. For example, what is of moral value, what does *moral value* mean, what is *computing*, and what does *computing value* mean?

Reducing the Data

After collecting the definitions, organizing the raw data, and noting overall impressions, the process of data reduction began. The method of decomposition a) assisted the researcher with interpretation, b) facilitated a more efficient coding phase, and c) exposed a taxonomy of meaning. The reduction phase was a two-step process: 1) decompose each definition narrative into a hierarchy of phrases, and 2) merge the hierarchies into a taxonomy, while eliminating overlap.

Reduction Step 1 – The researcher decomposed each definition narrative into a hierarchy of phrases. APPENDIX B presents all of the definition hierarchies. This section provides three decomposition examples: James Moor's (1985) definition, Philip Brey's (2000b) definition, and Herman Tavani's (2012) definition. For comparative purposes, this section provides the full definition narratives and the decomposed hierarchies. Each decomposition example begins with the qualifying term used by the definition author, followed by the hierarchy of phrases constructed by the researcher. Prepositions served as natural delimiters of phrases, while nouns and verbs provided the basis for codes.

James Moor's (1985) definition:

On my view, *computer ethics* is the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology. I use the phrase "computer technology" because I take the subject matter of the field broadly to include computers and associated technology. For instance, I include concerns about software as well as hardware and concerns about networks connecting computers as well as computers themselves. A typical problem in computer ethics arises because there is a policy vacuum about how computer technology should be used. Computers provide us with new capabilities and these in turn give us new choices for action. Often, either no policies for conduct in these situations exist or existing policies seem inadequate. A central task of computer ethics is to determine what we should do in such cases, i.e., to formulate policies to guide our actions. Of course, some ethical situations confront us as individuals and some as a society. Computer ethics includes consideration of both personal and social policies for the ethical use of computer technology…Indeed, much of the important work in computer ethics is devoted to proposing conceptual frameworks for understanding ethical problems involving computer technology…On my view, computer ethics is a dynamic and complex field of study which considers the relationships among facts, conceptualizations, policies and values with regard to constantly chaining technology…Computer ethics requires us to think anew about the nature of computer technology and our values…The challenge for computer ethics is to formulate policies which will help us deal with this dilemma. We must decide when to trust computers and when not to trust them. (Moor, 1985, pp. 266-275)

Moor’s (1985) definition decomposed into hierarchical form:

Computer ethics…

- is the
  - analysis of
    - the nature
    - social impact
      - of computer technology
  - formulation
  - justification
    - of policies for
      - the ethical use of
        - computer technology
- subject matter includes
  - computers
  - associated technology
  - software
  - hardware
  - networks
- has the central task of
  - formulating policies to
    - guide our actions when
      - policies do not exist
      - policies are inadequate
        - for conduct in situations created by
          - new capabilities
          - new choices for action
            - due to computers
  - proposing conceptual frameworks for
    - understanding ethical problems involving
      - computer technology
- is a field of study which is
  - dynamic
  - complex
  - considers relationships among
    - facts
    - conceptualizations
    - policies
    - values
      - with regard to changing technology
  - field of substantial practical importance
- requires
  - new thinking about
    - the nature of
      - computer technology
      - our values
- challenge is to
  - formulate policies which
    - help us deal with dilemmas

Philip Brey's (2000b) definition:

In his by now classical essay "What is computer ethics?" Jim Moor proposed that the central aim of computer ethics is to formulate policies to guide individual and collective action in the use of computer technology (Moor 1985). I agree with this proposal, with the addition that not just the use of computer technology, but also other practices that involve computing technology, such as its development or management, require the formulation of policy guidelines. When we conceive of computer ethics in this way, it is clear that it is a branch of *applied ethics*. Whereas its counterpart, theoretical ethics, is concerned with general aspects of morality, applied ethics is concerned with the study of morality in particular domains of human practice. Moreover, the aim of applied ethics is not merely to arrive at well-supported moral analysis, but also to use such analyses to affect the discourse, policies and practices that are prevalent in its domain of study.

The *scope* of computer ethics includes individual and collective practices that somehow essentially involve computers. This includes practices like the use, development, regulation, management, advocacy and advertisement of computer technology. Also included should be the products of such actions, e.g., computer systems and software, manuals, advertisements, and laws and policies regulating the use of computers. (Brey, 2000b, p. 125)

Brey's (2000b) definition decomposed into hierarchical form:

Computer ethics…

- has a central aim to
  - formulate policies
  - guide individual action
  - guide collective action
- is a branch of
  - applied ethics with an aim to
    - arrive at well-supported moral analysis
    - use analyses
    - affect discourse
    - affect policies
    - affect practices
- has a scope of
  - individual practice that essentially involves computers
  - collective practice that essentially involves computers
    - use
    - development
    - regulation
    - management
    - advocacy
    - advertisement
      - of computer technology
  - products of practice
    - computer systems
    - computer software
    - manuals
    - advertisements
    - laws
    - policies

Herman Tavani's (2012) definition:

Before we propose a definition of cyberethics, it is important to note that the field of cyberethics can be viewed as a branch of (applied) ethics...For our purpose, *cyberethics* can be defined as the study of moral, legal, and social issues involving cybertechnology. Cyberethics examines the impact of cybertechnology on our social, legal, and moral systems, and it evaluates the social policies and laws that have been framed in response to

> issues generated by its development and use…*Cybertechnology*, as used throughout this textbook, refers to a wide range of computing and communication devices, from stand-alone computers to connected, or networked, computing and communication technologies. (Tavani, 2012, pp. 3-4)

Tavani's (2012) definition decomposed into hierarchical form:

Cyberethics…

- is a branch of
  - applied ethics
- is the study of
  - moral
  - legal
  - social
    - issues involving
      - cybertechnology like
        - computing devices
        - communication devices
        - stand-alone computers
        - connected/networked technologies
- examines
  - the impact of
    - cybertechnology on
      - social
      - legal
      - moral
        - systems
- evaluates
  - social policies
  - laws
    - that have been framed in response to
      - issues generated by
        - development
        - use
          - of cybertechnology

Reduction Step 2 – After all 30 definitions were decomposed into individual hierarchies, the researcher combined all the hierarchical definitions into a single text file. The researcher then merged the hierarchies into a collective taxonomy, while eliminating redundancies. Five groupings emerged for the top level of the taxonomy: Attributes, Foundation, Method, Actions, and Recommendations. The most complex portion of the taxonomy is the Attributes section (Figure 3). APPENDIX C presents the complete definition taxonomy.

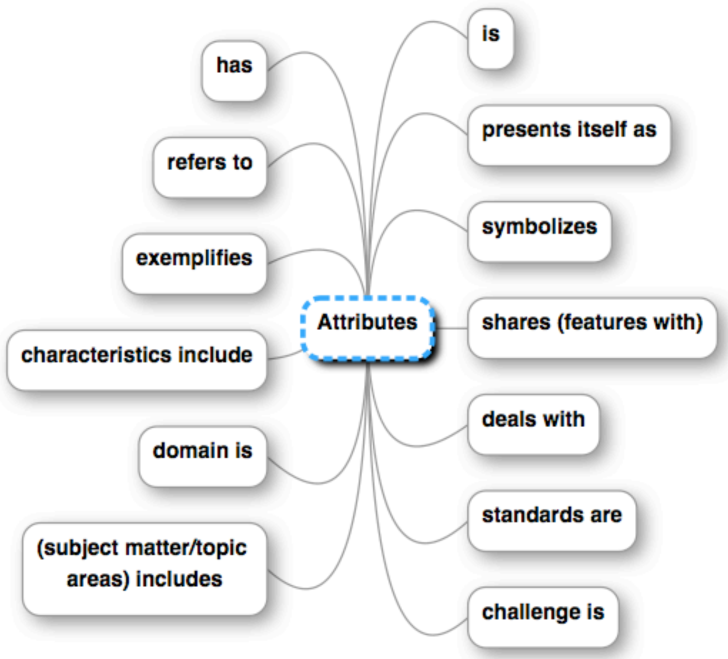

Figure 3: Attributes Taxonomy Group

The complexity of the Attributes section is illustrated by the following breakdown, which details the *is* category at the next sub-level.

Computer ethics…*is*…

- applied	- a field that/of	- {ethical values
- practical	- an ethics that/of	- rules
- infocentric	- a way of looking at	- judgments}
- a term that	- motivated by	- intrinsically decision-making oriented
- used to describe	- concerned with	- an ontocentric theory
- a broad range of	- (nature) represented by	- open to narrow interpretation including
- a branch of	- values that	- open to broad interpretation including
- an area of	- intertwined with	- the (systematic) study of
- a form of	- qualitatively like	- logically argumentative with
- the discipline that	- applied using	- empirically grounded with
		- a computer professional stating they have

A full segment of the taxonomy within the Attributes grouping is illustrated in the following example.

Computer ethics…*is*…*a term that*…

- has acquired a broad sense
- has a considerably varied scope
- refers to
    - applications by professional philosophers
        - of traditional Western theories like
            - utilitarianism
            - Kantianism
            - virtue ethics
        - to ethical cases that involve
            - computers
            - computer networks
    - a kind of professional ethics in which
        - computer professionals apply
            - codes of ethics
            - standards of good practice
                - within the profession
    - aspects of computer ethics associated with
            - the Internet

The following figures (Figure 4, Figure 5, Figure 6, Figure 7) illustrate the top level of the Foundation, Method, Actions, and Recommendations groupings.

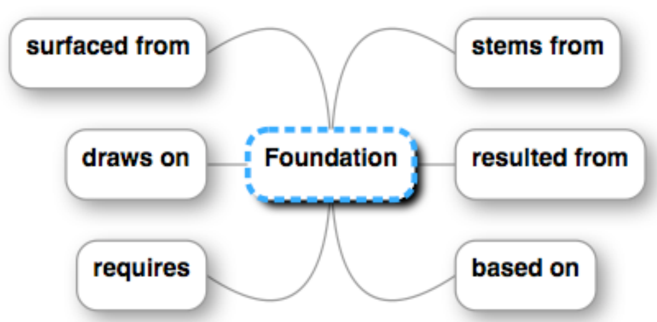

Figure 4: Foundation Taxonomy Group

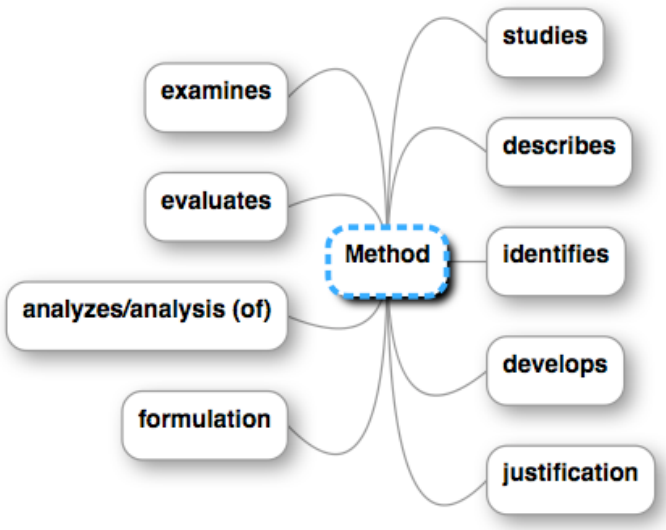

Figure 5: Method Taxonomy Group

Figure 6: Actions Taxonomy Group

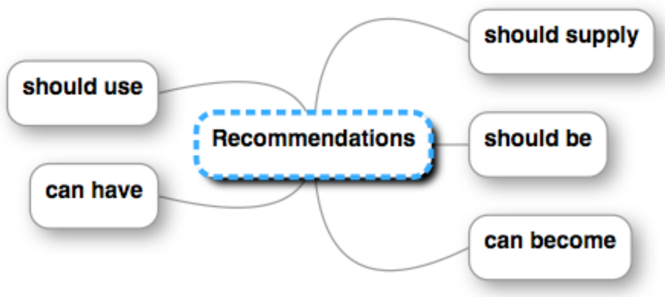

Figure 7: Recommendations Taxonomy Group

Coding

After the hierarchies were condensed into a comprehensive taxonomy, the researcher imported the taxonomy into the analysis tool Dedoose. The researcher then analyzed the data per the "Analysis Plan" outlined in "Chapter 3: Methodology." The researcher read the taxonomy word by word to derive codes, using a combination of in vivo and descriptive coding. As the process continued, labels for codes emerged that were reflective of the content. The labels often came directly from the text and became the coding scheme. Next, the researcher sorted the codes into categories based on relationships between distinct codes. The researcher then used the emergent categories to organize and group codes into meaningful clusters. The thematic categories, when combined in sequence, produced a synthesized definition of computing ethics.

A total of 500 unique codes emerged from the definition taxonomy. Table 9 presents codes that were applied four or more times in the definition taxonomy. APPENDIX D includes the codebook in its entirety, in alphabetic order, and with corresponding application counts. The top three most applied codes were *computer(s)*, *use*, and *applied (ethics)*. The counts signify that in the definitions the most frequently discussed computing artifact was *computer(s)*, the activity of primary concern was *use*, and the ethics category most associated with computer ethics was *applied ethics*.

Table 9: Definition Taxonomy – Top Code Application Counts

computer(s)	15
use	14
applied (ethics)	10
computer technology	9
information technology	9
development/create	8
ICT	7
impact (social)	7
actions/conduct	6
computing professionals	6
etc; whatever; and so on	6
study/studies (systematic)	6
decision-making (ethically informed)	5
issues (ethical)	5
philosophers	5
relationships	5
(computer) networks	4
broad	4
communication technology	4
decision-making/decisions	4
ethical problems (created/new)	4
formulate policies	4
impact (ethical)	4
impact on human values	4
information systems	4
Kantianism (rationalist)	4
policies	4
policy vacuums (fill)	4
related fields/other branches	4
responsibility(ies)	4
standards (professional)	4
technology	4
utilitarianism	4
values	4

Patterns, Interconnections, and Meaning

When the researcher analyzed the definition codes, patterns and interconnections emerged according to the following scheme:

- *Meta* – denotative of computer ethics itself (e.g., a term that, area of, based on)

- *Characteristics* – about, of (e.g., broad, complex, qualitative)
- *Who* – people associated with computer ethics (e.g., computer scientists, employees, users)
- *What* – objects of computer ethics (e.g., artificial agents, cybertechnology, information)
- *Where* – where computer ethics is applied (e.g., actions/conduct, design, issues)
- *Why* – for the sake of, or helps (e.g., access/participation, affect policies, human cost)
- *How* – method, how to do computer ethics (e.g., analyses, cases, collaborative work)
- *Frames* – fields, perspectives (e.g., Kantianism, codes of conduct, nanoethics)

During the initial search for patterns, the researcher divided some of the code counts between groupings based on the contextual use (meaning) of the terms or phrases (Table 10). Applied, as in *used*, with an application count of two, was split between Meta and How. Ethics (general), with an application count of two, was split between Meta and Where. Formulate policies, with an application count of four, was split between Why with three and How with one. Laws, with an application count of two, was split between What and Where. Legislation, with an application count of two, was split between Where and Why. Policies, with an application count of four, was split between Why with one, Where with two, and What with one. Rules, with an application count of two, was split between Where and Frame. The term *meta* was added to some codes in the How grouping because in the definitions the phrases occur at the Meta level. Another note is that the code *etc; whatever; and so on*, with an application count of five, was excluded from the groupings.

Table 10: Code Counts Split Based on Meaning

Code – Count	Meta	What	Where	Why	How	Frames
applied (used) – 2	1	–	–	–	1	–
ethics (general) – 2	1	–	1	–	–	–
formulate policies – 4	–	–	–	3	1	–
laws – 2	–	1	1	–	–	–
legislation – 2	–	–	1	1	–	–
policies – 4	–	1	2	1	–	–
rules – 2	–	–	1	–	–	1

APPENDIX E provides the initial pattern scheme, built on interconnected definition codes, in its entirety. Table 11 presents the number of codes and the top code(s) for each category in the pattern scheme.

Table 11: Definition Pattern Scheme

Pattern	Number of Codes[a]	Top Code(s) – Count
Meta	65	focuses on – 3; task of/to – 3
Characteristics	17	broad – 4
Who	35	computing professionals – 4; philosophers – 5
What	50	computer(s) – 15
Where	131	use – 14; development/create – 8
Why	79	policy vacuums (fill) – 4
How	53	study/studies (systematic) – meta – 6
Frames	77	applied (ethics) – 10

[a]*n* = 507 due to code counts split based on meaning; and *etc…* code excluded.

Though Table 11 presents the top codes and counts for the pattern groups, some groups contained very similar codes that, when combined, would take precedent. Two examples are *ethical problems* in the Where group and *impact* in the Why group as illustrated in Table 12.

Table 12: Similar Code Examples

ethical problems	impact
ethical dilemmas	impact (general)
ethical problems	impact on codes of conduct
ethical problems (aggravated/exaggerated)	impact on social arrangements
ethical problems (created/new)	impact on social institutions
ethical problems (transformed/convert)	impact on social practices

The pattern scheme provided the first reduced and interconnected view of computer ethics. However, the scheme needed more themeing and emphasis on meaning in order to distill a comprehensive definition of computer ethics.

Themes

The next step in the analysis plan was to map and build themes. Working off of the pattern scheme, the researcher analyzed the codes for deeper meaning and emergent themes. This section presents examples of code-to-theme mapping. Pattern-based codes led to thematic groups, which led to themes. APPENDIX F presents the complete results of the themeing phase. The thematic groups and themes provide a descriptive overview of what computer ethics *is* in a comprehensive sense. The Meta and Characteristic pattern groupings required no modification in the themeing phase. The theme of the Meta and Characteristic groupings taken collectively is the *is-ness* of computer ethics.

The Frame pattern grouping represented the first departure from the pattern scheme into more meaningful themes. Six thematic groups and two themes emerged from the Frame pattern. Table 13 presents a corresponding map and provides example codes.

Table 13: Interdisciplinary and Collaborative as Themes

Themes	**INTERDISCIPLINARY**			**COLLABORATIVE**		
Thematic groups	**Disciplines**	**Ethics**	**Theories**	**Life/General**	**Work**	**Codes/P/C**[a]
Sample codes	law	Internet ethics	Kantianism	economic dimensions	collective practice	choices (principled)
	philosophy	nanoethics	normative theories	new thinking	experience (job)	legal advice
	sociology	virtue ethics	utilitarianism	possible harm	skill (job)	moral norms

[a]Codes/P/C denotes Codes/Principles/Considerations.

Two distinct themes emerged from the Who pattern grouping, one of which had two thematic groups. Table 14 presents a corresponding map and provides example codes.

Table 14: Scholars and Professionals, and Global Society as Themes

Themes	**SCHOLARS and PROFESSIONALS**		**GLOBAL SOCIETY**
Thematic groups	**Professions**	**Work**	–
Sample codes	computer scientists	clients	affected individuals
	engineers	employees	people (vulnerable)
	scholars	employers	users

Five thematic groups and one theme emerged from the How pattern grouping. Table 15 presents a corresponding map and provides example codes.

Table 15: Methodically Study as a Theme

Theme	**METHODICALLY STUDY**				
Thematic groups	**Approach**	**Analysis/Study**	**Describe/Identify**	**Tools**	**Outcomes**
Sample codes	democracy (co-creates)	global analyses	describes – meta	analogical reasoning	formulate policies – meta
	methodologies	moral analysis	ethical issues (clarify)	case studies	provide conclusions
	procedures	examining	identifies – meta	arguments	tactical solutions

The remaining three pattern groups What, Where, and Why did not require further mapping, since the pattern groups offered emergent themes based on the interrelated codes. Table 16 presents the example codes, pattern groups, and themes.

Table 16: Practically Affect, Contributions and Costs, and Computing Artifacts as Themes

Theme	**PRACTICALLY AFFECT**	**CONTRIBUTIONS and COSTS**	**COMPUTING ARTIFACTS**
Pattern group	**Where**	**Why**	**What**
Sample codes	choices	concern(s)	applications (software)
	design	digital divide	Internet
	impact on freedom	justice	complex systems
	moral questions	monitoring/surveillance	manuals
	responsibility(ies)	reliability	test cases

The researcher did not map codes leading to the *Contributions and Costs* theme into separate *contributions* and *costs* thematic groups because most codes in the group are viewable as a contribution or cost depending on perspective. As for codes leading to the *Computing Artifacts* theme, some latent thematic groups exist (e.g., hardware, software, networks), but the researcher decided the theme of Computing Artifacts expressed the comprehensive meaning of the 50 codes.

A Synthesized Definition

The analysis plan, as described and followed, led to a synthesized definition of computing ethics. The definition is based on the themes that emerged from the content analysis of the explicit definitions of *computer ethics* and synonymous terms. Also, considering the definition of *computing* as presented in "Chapter 1: Introduction," this study presents the synthesized definition with the phrase *computing ethics* instead of *computer ethics*. The data analysis points to the interdisciplinary nature of what has traditionally been called computer ethics. The term *computing* offers a broader and more appropriate notation of the ethics under discussion with regard to artifacts, attributes, and disciplines.

The definition in hierarchical form highlights the *emergent themes*:

Computing ethics *is*…

- the *interdisciplinary* and *collaborative* efforts of
    - *scholars and professionals* to
        - *methodically study* and *practically affect* the
            - *contributions and costs* of
                - *computing artifacts* in
                    - *global society.*

The narrative form is as follows:

> Computing ethics is the interdisciplinary and collaborative efforts of scholars and professionals to methodically study and practically affect the contributions and costs of computing artifacts in global society.

The definition offers a definitive foundation for computing ethicists conducting research and for computing educators developing curriculum. The definition also provides a theoretical frame for relating computing to ethical concepts.

Conceptually, the computing ethics definition is communal, academic, professional, theoretical, practical, global, and comprehensive. The conceptual attributes set the definition apart from previous attempts at ethics definition (computing-based definition examples are discussed in the following "Verification" section). The definition of *business ethics* presented by Lewis (1985) provides a point of comparison: "*'business ethics' is moral rules, standards, codes, or principles which provide guidelines for right and truthful behavior in specific situations*" (p. 382). Such a definition is extremely narrow and suggests that business ethics *is* merely guidelines. The definition of computing ethics subsumes phrases such as "moral rules," "standards," "codes," and "principles" into the Codes/Principles/Considerations thematic group, which is an element of the Collaboration theme. Codes are born out of social contexts and apply to behavior in social contexts, thus codes are inherently collaborative (communal). Further, "specific situations" are covered by the Practically Affect theme.

Surprisingly, unlike business ethics content examined by Lewis (1985), the explicit computer ethics definitions examined in this study contained no discourse of *right*, *wrong*, and *truthful*. Nor did the definitions contain discourse of *good* or *bad*. An advantage of the absence of such terms is a focus on *that which is* good, bad, right, and wrong and not on what is meant by the terms *good, bad, right,* and *wrong*. Still, the definitions did contain *moral* discourse. The computing ethics definition also has a decidedly economic tone. All efforts are concentrated on studying and affecting computing artifacts' contributions and costs in global society. Computing ethics may be an area to explore with the lens of economic theory, a task yet to be undertaken in the computing and ethics literature.

Verification

Verification of the computing ethics definition took on four forms. Two methods discussed in this section are 1) the consideration of definition test cases, and 2) a quantitative analysis of the explicit definitions for comparison. The researcher's use of the definition (framework) to map the codes emerging from the journal article data for Research Question 2 (discussed in "The Subject Matter of Computing Ethics" in Chapter 4) was a third form of verification. The final verification is provided by the comparative analysis results of Research Question 3.

The first definition test case was a definition of *ICT ethics*, which the researcher found after the primary data analysis. The find provided the researcher with an opportunity to test the comprehensive nature of the synthesized definition against typical occurrences of explicit definitions in the literature. Bernd Stahl and Simon Rogerson presented the definition in a conference proceedings paper of the 2009 *Computer Ethics: Philosophical Enquiry (CEPE)* conference. Stahl and Rogerson (2009) stated, "In this project the term 'ICT ethics' will be used to denote ethical issues that arise from or in conjunction with ICT" (p. 723). First, the use of phrasing such as "the term…will be used to denote" corresponds to the definition taxonomy phrase "a term that…refers to." The individual terms of the acronym "ICT" and the acronym itself are components of the definition taxonomy and thematic map (in Computing Artifacts).

The phrase "ethical issues" is a component of the thematic map (in Practically Affect), while "arise from" confirms category placement.

The elements of the Stahl and Rogerson (2009) definition can be directly compared to the definition themes derived in this study to see if the elements conceptually fit.

- ICT ethics: *Computing Ethics*
- Ethical issues: *Practically Affects*
- ICT: *Computing Artifacts*

The first test case verifies the inclusive nature of the synthesized definition when applied to a basic and random definition.

More often in the literature, authors make shorter statements that are not definitive, but do describe *computer ethics*. Another paper from the same conference proceedings provides an illustration of such writing. Adam Briggle (2009) made the following statements:

> Computer ethics has been subject to several interpretations…And it has undergone previous expansions to include not just systematic study of the impacts of computers on society, but also society on computers…the field largely adopts an "ethics of the right" focused on right and wrong conduct in the design and use of information technology. Though important, this focus is limited. It does not conceptualize or evaluate how new media are qualitatively altering the way people live…Computer ethics is primarily an applied field…Computer ethics has traditionally focused on rights, risks, and justice. (Briggle, 2009, p. 136)

The synthesized framework comprehensively addresses Briggle's statements, phrases, and words. Corresponding words and phrases existing in the definition taxonomy and thematic map are as follows: computer ethics, systematic study, impacts, computers, society, field, focused on, conduct, design, use, information technology, limited (narrow), conceptualize, qualitative, people, applied, rights, risks, and justice. More importantly, Briggle's (2009) sentiments can be linked to the sentiments of the definition themes.

- Qualitative, applied, field: *Characteristics* (taxonomy and pattern group)
- Computer ethics has been subject to several interpretations, live: *Interdisciplinary and Collaborative*
- Systematic study, conceptualize, evaluate: *Methodically Study*
- Impacts on society, conduct in the design and use, rights: *Practically Affect*
- Risks, justice: *Contributions and Costs*
- Computers, information technology, new media: *Computing Artifacts*
- People: *Global Society*

The test of Briggle (2009) verifies the inclusive nature of the synthesized definition when applied to typical sentiments about computer ethics as expressed in the literature.

The third test case was to tie the synthesized definition back to the original conceptualization of Norbert Wiener presented at the beginning of this section, "Defining Computing Ethics." Wiener (1954) stated, "I shall discuss that field in which the communicative characters of man and of the machine impinge upon one another, and I shall try to ascertain what the direction of the development of the machine will be, and what we may expect of its impact on human society" (p. 136). Wiener's sentiments link to the definition in the following ways:

- Field, communicative characters: *Characteristics* (taxonomy and pattern group)
- Impact on society, direction of the development: *Practically Affect*
- Discuss, ascertain: *Methodically Study*
- Impinge: *Contributions and Costs*
- The machine: *Computing Artifacts*
- Man, human: *Global Society*

The definition is synchronous with Wiener's conceptualization, and encompasses the 30 explicit definitions and representative test cases.

Another method of verification was a quantitative analysis of the definition taxonomy. Verification in this instance means that the codes, patterns, and themes derived from the qualitative analysis do not venture far from the terminology and emphasis of the definition authors. Per the analysis plan, the researcher analyzed the definition taxonomy using WordSnapper. The results offered a purely statistical description of the data. The researcher compared the words and frequency counts to the qualitative codes and application counts. In all cases, the individual words (Table 17) and root-based combinations (Table 18) with the highest frequency counts link to the thematic map (Appendix F). In most cases, the individual words link to multiple themes in the map. In all cases, the top code application counts (Table 9) match to a top frequency count and/or top combined frequency count.

Table 17: Definition Taxonomy – Top Frequency Counts

Word	Freq.		Word	Freq.		Word	Freq.
computer	35		systems	11		legal	6
ethical	35		decisions	10		policy	6
ethics	34		human	10		practical	6
technology	28		new	10		public	6
moral	22		development	9		theories	6
use	21		professionals	9		design	5
information	19		conduct	8		internet	5
problems	19		impact	8		nature	5
issues	18		privacy	8		other	5
values	16		action	7		philosophers	5
computing	15		analysis	7		property	5
computers	14		practice	7		regarding	5
professional	14		society	7		responsibility	5
social	13		study	7		software	5
applied	12		communication	6		studies	5
standards	12		dilemmas	6		technologies	5
policies	11		ict	6			

Table 18: Definition Taxonomy – Top Frequency Counts by Shared Root

Words	Freq.		Words	Freq.		Words	Freq.
ethical, ethically, ethics	70		analyses, analysis, analyzed, analyzes	14		privacy	8
computer(s), computing, computational	65		decision(s), decision-making	13		responsible, responsibility(ies)	8
use, usage, used, user(s), using	34		standard(s)	13		communication, communicative	7
technology(ies)	33		study, studies	12		involve(s), involving	7
profession, professional(s)	26		action(s)	11		philosophers, philosophy, philosophical	7
social, society, sociology	24		impact(s)	11		regard(ing)	7
moral	22		human	10		be, become, becoming, been	6
problem(s)	21		include(s), including	10		concern(s), concerned	6
information	19		new	10		dilemmas	6
issues	18		related, relation(s), relationship(s)	10		employee(s), employer(s), employment	6
practice(s), practical, practicing, practitioners	18		theory, theories, theoretical	10		global, globally, globalization	6
policy, policies	17		concepts, conceptual, conceptualizations	9		guide, guidelines	6
value(s)	17		ICT(s), ICT-based	9		people, personal	6
law(s), legal, legislation	16		make(ers), making	9		process(es), processing	6
applied, apply	15		conduct	8		public	6
develop(s), developed, developing, development	15		form(s), formulate, formulating, formulation	8		solutions, solving	6
system(s)	15		individual(s), individuality	8		work, working, workplace	6

The frequency analysis indicates that the terminology used in the definitions and the meanings derived during the qualitative analysis are comparable.

Conclusions

In this methodical analysis, the researcher has identified the themes that define computing ethics. The researcher has illustrated the complexities of seeking consensus around a definition by exhibiting explicit definitions, the definition taxonomy, pattern scheme, thematic map, and frequency counts. The researcher has offered an explicit working definition of computing ethics that provides the computing community with a foundation for research and education. The researcher has substantiated the composition and scalability of the computing ethics definition with qualitative and quantitative reasoning. The definition, as a framework, is a substantial contribution of this research study.

The Subject Matter of Computing Ethics

Research Question 2: What is the subject matter of journals with a computing ethics scope?

Journal Data Collection

Four journals served as data sources for exploring the subject matter of computing ethics. The primary criterion for journal selection was that the journal had a foundational scope of computing and ethics. An important consideration that some writers bring to light, such as (Tavani, 2001, 2002), is the use of the term *ethics* to mean social issues in computing versus genuine ethics issues. The journal scopes include the terms *ethical* and *social* together. Consistently throughout the literature, the ethical and the social are inseparable terms and concepts. The researcher's stance in the study was that the ethical and social are intertwined and cannot be separated. As MacIntyre (2007) stated, a moral philosophy "characteristically presupposes a sociology," meaning a social group underpins ethics (p. 23). Other considerations for journal selection included popularity, impact, and primary avenues amongst prominent authors in the field of computing ethics.

The following list states the selected journals, along with the published scopes:

a. *ACM Computers and Society (ISSN: 0095-2737)*

   SIGCAS is the ACM Special Interest Group that addresses the social and ethical consequences of widespread computer usage. SIGCAS' main goals are to raise awareness about the impact that technology has on society, and to support and advance the efforts of those who are involved in this important work. (http://www.sigcas.org)

   SIGCAS brings together computer professionals, specialists in other fields, and the public-at-large to address concerns and raise awareness about the ethical and societal impact of computers. (http://dl.acm.org/citation.cfm?id=J198)

b. *IEEE Technology and Society Magazine (ISSN: 0278-0097)*

   The following topics describe the scope of SSIT and of Technology and Society Magazine: Health and safety implications of technology, Engineering ethics and professional responsibility, Engineering education in social implications of technology, History of electrotechnology, Technical expertise and public policy, Social issues related to energy, Social issues related to information technology, Social issues related to telecommunications, Systems analysis in public policy decisions, Economic issues related to technology, Peace technology, Environmental implications of technology. Beyond these specific topics, Technology and Society Magazine is concerned with the broad area of the social implications of technology, especially electrotechnology.

(http://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=44)

c. *Ethics and Information Technology (ISSN: 1388-1957)*

Ethics and Information Technology is a peer-reviewed journal dedicated to advancing the dialogue between moral philosophy and the field of information and communication technology (ICT). The journal aims to foster and promote reflection and analysis which is intended to make a constructive contribution to answering the ethical, social and political questions associated with the adoption, use, and development of ICT.

Within the scope of the journal are also conceptual analysis and discussion of ethical ICT issues which arise in the context of technology assessment, cultural studies, public policy analysis and public administration, cognitive science, social and anthropological studies in technology, mass-communication, and legal studies. Research that deals with the history of ideas and provides intellectual resources for moral and political reflection on ICT is also welcomed. The general editorial policy is to publish work of high quality regardless of school of thought or philosophical tradition from which it derives.

(http://www.springer.com/computer/swe/journal/10676)

d. *Journal of Information, Communication, and Ethics in Society (ISSN: 1477-996X)*

The Journal of Information, Communication and Ethics in Society aims to promote thoughtful dialogue regarding the wider social and ethical issues related to the planning, development, implementation and use of new media and information and communication technologies.

> Information and communication technologies and new media have advanced dramatically over the last decade. It has been an era of constant change. From the paperless office and the information superhighway to nanotechnology and virtual learning environments these technologies continue to impact upon society, organisations, the environment and individuals. Much can be learnt from this technological journey about the opportunities as well as the significant social and ethical risks that can arise. It is vital that insight is provided into how we can harness the huge potential of future technological advances whilst avoiding the social and ethical risks.
> (http://www.emeraldinsight.com/products/journals/journals.htm?id=jices)

The study did not include disparate articles on ethics and computing published in journals where ethics was not a primary component of the journal scope. The primary reason for not using disparate articles was the time limitation for completing the study. Amassing a collection of disparate articles on the broadly defined topic of *computing and ethics* was not *doable*. The researcher did review a fragment of disparate articles as part of the literature review for this study and as a preparatory exercise. Three categories of disparate computer ethics articles emerged: 1) teaching ethics in computing, 2) perceptions on various topics related to ethics (via surveys), and 3) development and application of codes of conduct and models. Such articles do not contribute to the subject matter per se. Computer ethics involves approaches to teaching ethics, but *is* not computer ethics. Further, the concept of teaching does not occur in any definitions nor was it found in the definition framework.

The researcher retrieved the journal article data from online databases provided by the publishers of the four journals. Each of the publishers published journal content in different formats. Therefore, the researcher took manual and programmatic steps to clean the varied data sets. The researcher saved the article titles, author(s), and number of pages in plain text files delimited by year, volume, and issue. The researcher collected and organized the data digitally as separate files (by journal) in folders. After concluding the collection phase, the researcher imported the article data into Excel for organization. The researcher organized the articles in Excel by Title, Author(s), Year, and Publication.

The journal article data set included articles published from each journal's beginning date to 2012. The data set excluded editorials without titles, commentaries, reviews, introductions without titles, book excerpts, bibliographies, interviews, and comment pieces. The total data set was 1,745 articles. The study limited the sample used for analysis to complete volumes published within five years of the research study. From 2009 to 2012, the four journals published a total of 346 articles, a sample size of approximately 20%. APPENDIX G presents the 2009 – 2012 article data set.

Meta-data Analysis

Table 19 shows the number of articles per journal in the complete data set of 1,745 articles from beginning dates to 2012. The difference in portion percentages in the full set (Table 19) versus the sample data set (Table 20) is a function of the inception dates and fluctuations in issues per year across time. For example, *ACM Computers and Society* changed from four issues per year to two issues per year in 2011.

Table 19: Article Meta-data (beginning-2012)

Journal	First Year	Number of Articles	Percentage
ACM Computers and Society	1972	559	32.03%
Ethics and IT	1999	347	19.89%
IEEE Tech. and Society Mag.	1982	651	37.31%
JICES	2003	188	10.77%

Table 20 shows the number of articles and percentages of the sample, by journal, used in the study analysis.

Table 20: Article Meta-data (2009-2012)

Journal	Number of Articles	Percentage of Sample
ACM Computers and Society	48	13.87%
Ethics and IT	107	30.92%
IEEE Tech. and Society Mag.	117	33.82%
JICES	74	21.39%

Initial Issues and Impressions

During the article data collection and organization process, the researcher noted initial issues and impressions.

- The varying formats of the online journal databases made retrieving the data tedious.
- Filtering of journal content matter and non-descriptive content occurred during data collection.
- Journal *special issues* were easily identifiable, even without explicit notation.
- Prominent computer ethics authors published regularly in and across the four journals.
- The journals shared a variety of themes, but each journal had a *content identity*.
- Authors in *Ethics and Information Technology*, a philosophy-oriented journal, were more likely to use analogous language in titles.

Reducing the Data

The analysis plan for the journal articles had several iterations. In the first iteration, the plan was to qualitatively analyze the entire data set of 1,745 articles. Early in the project, the researcher recognized such a study was unachievable given the time limitations. Therefore, the researcher selected the data from 2009-2012, and planned to qualitatively code the journal titles, along with the abstracts. The researcher performed the title and abstract analysis on 29 articles published in *IEEE Technology and Society Magazine* in 2009. The process indicated that an abstract brings clarity to an article title's meaning, but would quickly make the coding scheme obtrusive.

Therefore, the researcher elected to qualitatively code the titles of the 346 journal articles in the study sample, while only using the abstracts if necessary to clarify title terminology. The general expectation of article titles is that titles are thematically representative of the content contained in the article. For most articles, the abstract was not necessary for the coding process. However, sometimes titles required reference to the abstract to help determine meaning. The journal article titles that required the most abstract verification were from the *Ethics and Information Technology* journal. Overall, the iterative process led the researcher to a manageable amount of thematic data for exploring the subject matter of computing ethics based on the data set.

Coding

After organizing the article data in Excel, the researcher imported the data into the analysis tool Dedoose. The researcher then analyzed the data per the analysis plan. The researcher read the titles word by word to derive codes, using a combination of in vivo, descriptive, and thematic coding. If necessary, the researcher verified the meaning of terminology by examining article abstracts. As the process continued, labels for codes emerged that were reflective of the content. The labels often came directly from the text and became the coding scheme.

The main difference between the coding phases for the definition taxonomy and the article data was that, for the article data, the researcher used the thematic framework derived from the definitions to organize the codes that emerged from the article titles into meaningful clusters. The approach made the code mapping process efficient and simultaneously assessed if the definition framework delineated the subject matter of computer ethics. The topical patterns derived from the article titles denote the subject matter of computing ethics.

A total of 831 unique codes emerged from the article data. Table 21 presents codes that were applied four or more times in the article data. APPENDIX H includes the codebook in its entirety, in alphabetic order, and with corresponding application counts.

Table 21: Subject Matter – Top Code Application Counts

privacy	23	understand(ing)	5
ICT(s)	23	challenge(s)	5
design/development/model/creation	19	friendship	5
ethics	14	digital divide(s)	5
technology	14	humanitarian engineering/development	5
use	10	capabilities/capacity	4
trust	9	role	4
Facebook	9	evaluate/evaluation	4
cyberspace/web space/(online) environment	9	explore	4
social network sites/technology	8	study/studying	4
analogies	7	identity (affect)	4
sustainability (general)	7	regulation(s)	4
Internet	7	information justice	4
issues (ethical)	6	security (cont/cost)	4
implications (ethical)	6	(Google) Street View	4
information technology	6	emerging/new technologies	4
software (free)	6	robots	4
reality	5	software (open source)	4
case studies	5	global	4

Patterns, Interconnections, and Meaning

Since the researcher used the definition themes to organize the subject matter codes, the patterns took on the form of topics that emerged from the article titles. The framework pre-established the interconnections. As in a few cases with definition coding, some of the article codes contextually fall into multiple categories. For example, the *digital divide* can be

Practically Affected, while at the same time might be perceived as a Cost. *Surveillance* can be thought of as something to be Practically Affected, a Contribution or Cost, or a Computing Artifact. Therefore, identical codes can exist under more than one theme due to the varied term meanings.

Table 22 presents the dominant patterns (topics) that emerged from the article titles. The topic most common across the journals was *privacy*: a dominant pattern in all four journals. Common topics across three journals included *information and communication technologies (ICTs)* and *design/development*. Top patterns in two journals included *technology*, *Internet*, and *ethics (general)*. APPENDIX I includes the complete index of patterns by journal.

Table 22: Subject Matter – Top Topic Patterns by Journal

ACM Comp. & Soc.	IEEE Tech. & Soc.	Ethics & IT	JICES
use	privacy	design/development	ICT(s)
privacy	technology	ICT(s)	ethics
(Google) Street View	design/development	trust	case studies
ICT(s)	sustainability	ethics	cyberspace/online
–	humanitarian engineering	friendship	role
–	challenge(s)	privacy	analogies
–	security (contribution/cost)	social networks	study/studying
–	Facebook	capabilities/capacity	design/development
–	Internet	issues (ethical)	privacy
–	–	information tech.	Internet
–	–	technology	–

Themes and Verification

The researcher used the definition themes to organize the subject matter codes, thereby assessing the applicability of the definition framework to the subject matter of computing ethics. Though a wide range of topics emerged from the article data, all codes and patterns fell within the thematic framework. The definition framework the researcher used to organize subject matter codes was as follows:

- Interdisciplinary
    - Disciplines
    - Ethics
    - Theories
- Collaborative
    - Codes/Principles/Considerations
    - Life/General
    - Work
- Scholars and Professionals
- Methodically Study
- Practically Affect
- Contributions and Costs
- Global Society

The following tables (Table 23, Table 24, Table 25, Table 26, Table 27) illustrate the definition themes along with sample subject matter topics.

Table 23: Interdisciplinary and Collaborative Topics

Themes	**INTERDISCIPLINARY**			**COLLABORATIVE**		
Thematic groups	**Disciplines**	**Ethics**	**Theories**	**Life/General**	**Work**	**Codes/P/C**
Sample codes	biotechnology	business ethics	Aristotelian friendship	biculturalism	cooperative workflows	etiquette
	computer science	information ethics	critical theory	gender	multi-tasking	morality
	engineering	robotics ethics	pragmatism	race	software work	social contract

Table 24: Scholars and Professionals Topics

Themes	**SCHOLARS and PROFESSIONALS**
Sample codes	computing professional
	designers
	humanitarians
	nanotech enterprises
	policy makers

Table 25: Methodically Study and Practically Affect Topics

Theme	**METHODICALLY STUDY**	**PRACTICALLY AFFECT**
Sample codes	assessment	ICT pollution
	critique	democracy
	critical systemic thinking	file sharing
	ethical discourse	Internet content filtering
	mental models	normative structure

Table 26: Contributions/Costs and Computing Artifacts Topics

Theme	**CONTRIBUTIONS and COSTS**	**COMPUTING ARTIFACTS**
Sample codes	autonomy	autonomous systems
	classroom visual accessibility	cyber cafés
	human enhancement	electronic books
	liability	new media
	social memory	smartphone recordings

Table 27: Global Society Topics

Theme	**GLOBAL SOCIETY**
Sample codes	Aboriginal communities
	Pan-European
	aging populace
	millennials
	students (undergraduate)

The definition themes proved to be an effective framework for categorizing subject matter codes. The code mapping process was another form of verification that the themes derived in this study both define computing ethics and delineate its subject matter.

As with the definition taxonomy, the researcher conducted a quantitative analysis of the article data. Again, the reason for quantitative description in this study was to ensure that the codes and topics derived from the qualitative analysis did not venture far from the terminology and emphasis of the article authors. The researcher analyzed the article data using WordSnapper.

The frequency analysis offered a purely statistical description of the data. The researcher compared words and frequency counts to the qualitative codes and application counts.

Table 28 displays the top frequency counts for the subject matter. *Information* tops the list, which the researcher expected, as *information* is a qualifier for many bigrams and phrases in computing. *Privacy* was the second highest frequency, which matches with the findings of the qualitative analysis. Privacy is the most dominant topical pattern in the subject matter of computing ethics. *Ethics*, *ethical*, *social*, *technology*, *moral*, *communication*, *ICT*, and *systems* complete the top ten frequencies.

Table 28: Subject Matter – Top Frequency Counts

information	40	age	8	designing	6
privacy	38	communities	8	evaluation	6
ethical	34	computer	8	free	6
ethics	33	computing	8	networking	6
social	30	design	8	networks	6
technology	26	online	8	research	6
moral	20	society	8	students	6
communication	13	web	8	sustainability	6
ICT	13	world	8	artificial	5
systems	13	capabilities	7	business	5
virtual	13	case	7	decision	5
digital	12	development	7	developing	5
implications	12	friendship	7	divide	5
internet	12	good	7	education	5
issues	12	human	7	future	5
trust	12	humanitarian	7	gender	5
engineering	11	identity	7	ICTs	5
new	11	IT	7	knowledge	5
rights	10	justice	7	media	5
software	10	management	7	normative	5
approach	9	sites	7	open	5
facebook	9	study	7	policy	5
robots	9	transparency	7	revolution	5
security	9	using	7	understanding	5
technologies	9	analysis	6	view	5

The qualitative application counts and quantitative frequency counts have commonalities. Considerable overlap exists between the top counts in both sets of raw results. Also, the researcher combined similar top frequency words for comparison with the dominant topics that emerged from the qualitative analysis. Figure 8 illustrates the commonalties.

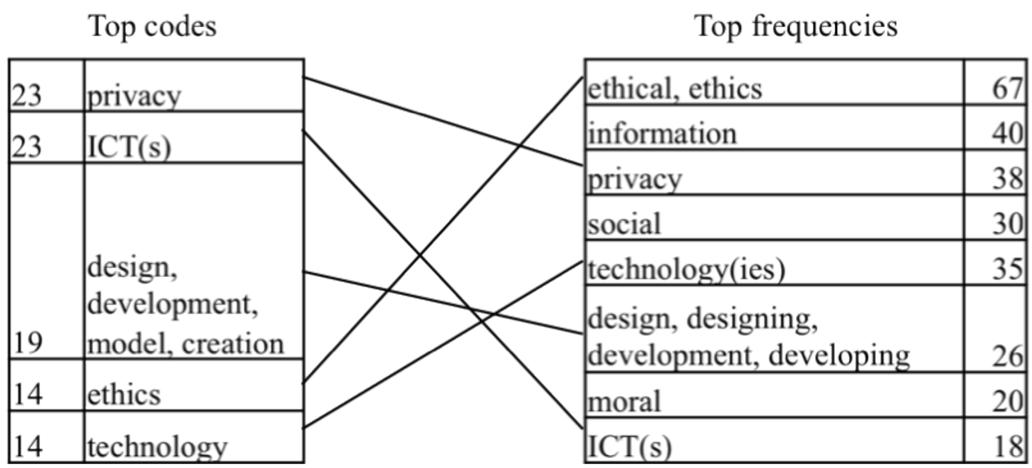

Figure 8: Top Code and Frequency Comparison

The top five qualitative patterns are contained within the top eight quantitative patterns. Both analysis methods show consensus on the patterns of *privacy, ICT(s), design/development, ethics,* and *technology*. The remaining top frequency words are *information, social,* and *moral*: three foundational concepts in computing ethics. When the combined results are ranked, the following list is the output:

1. Ethics (81)
2. Privacy (61)
3. Technology (49)
4. Design and Development (45)
5. Information and Communication Technologies (ICTs) (41)

The descriptive results also confirm that the interpreted meanings do not stray from terminology used in the article titles.

Subject Matter and Conclusions

A sentiment authors express repeatedly throughout the literature is that computing ethics is broad and complex. The number of unique codes and the variety of topics within the sample article data are evidence of the breadth and complexity of computing ethics. Still, the definition themes proved an effective framework for categorizing the varied subject matter. And the distilled subject matter is synonymous with the definition. Therefore, the definition themes *are* the subject matter of computing ethics. In a topical sense, the most popular subjects in journals with a scope of computing ethics are privacy and design/development. Trust is another popular topic. The principle computing artifacts are technology, ICTs, and cyberspace. Authors also focus on the use and methodological study of technologies. Expectedly, the ethical, the moral, and the social are prominent.

The Definition and Subject Matter Compared

Research Question 3: How does the definition derived from Question 1 relate to the subject matter derived from Question 2?

The results that the researcher has presented in response to RQ1 and RQ2 have partially answered RQ3. The thematic definition provided a viable framework for categorizing the subject matter. Therefore, the researcher has established that the results are thematically and theoretically related. Further comparative analysis expounds upon the relationship between the definition of computing ethics and the subject matter of computing ethics.

Codebooks Compared

The researcher compared the qualitative codes that emerged from the definitions and article titles. A search for direct conceptual similarities resulted in 130 points of overlap between the two codebooks.

Table 29: Code and Conceptual Overlap

access/participation	design…	information systems	promotion
adopting…	develop…	information technology	protect
individuals…	digital divide	information…	public…
analogies	dilemmas	innovation	regulation
analysis	economic dimensions	integration	relation(ships)
applying, apply (as in use)	education	interests	research
artificial agents	empirically thinking/grounded	Internet	responsibility(ies)
artificial intelligence	engineering	interplay/intertwined	responsibility (moral)
case studies	engineering ethics	investigate	robotics
cases	entropy	issues (ethical)	rules…
challenges	ethical…	issues…	safety
changes	ethics	judgments	scenarios
choices	evaluate	justification	security
codes of ethics/conduct	examples/exemplifies	law	sharing
collaborative	experience	methodology	slaves
communicative characteristics	explore	minimizing risk	social…
computer science	formulate	moral considerations	society
computer(s)	global	moral…	software
computing…	globalization	nano…	strategies/strategic
computing discipline/courses	global society	networks	study
computing professionals	govern(ing)	new…	technology
concepts/conceptual thinking	groups	normative structures	theoretical foundations/thought
conceptualization	hardware	notice/awareness	theories
concerns	harm(ful)	online	transformations
corporate ethics/responsibility	health	personal	trust
crime	human	philosophy	universal…
criteria	ICT…	policies	use
cyber-crime	identity theft	political dimensions	use (ethical)
data…	impact (ethical)	power	users
deal with	impact (general)	practical	values…
decision-making	impact…	practices	work environment
defend/defensible	information	privacy	–
democracy	information society	professional	–

Thus, a substantial relationship exists between the definitions and subject matter. Table 29 presents the codes that exist either explicitly or conceptually in both codebooks. An ellipse indicates a concept that represents a variety of instances within one or both codebooks. For example, *nano…* represents *nanoethics*, *nanotech enterprises*, and *nanotechnology*. The top codes (by application count) from both codebooks are found amongst the conceptual similarities. The top definition code matches are *computer(s)*, *use*, *ethics*, *technology*, *develop*, and *ICT*. The top subject matter code matches are *privacy*, *ICT*, *design/develop*, *ethics*, and *technology*.

The codebook comparative analysis showed that approximately 26% of the definition concepts overlap with the subject matter. The researcher expected a certain amount of overlap, but did not anticipate the amount found at the micro (code) level. The researcher expected the definitions to exude a broad tone, while expecting the article titles to be narrower. While the expectations remained generally true, a surprising amount of detail constitutes the definitions, and a high level of broadness composes many article titles. The result is a mixture of broad and narrow overlap. Broad examples include *ethics*, *issues*, *responsibility*, *study*, *theories*, and *values*. Narrow examples include *artificial agents*, *entropy*, *health*, *power*, *slaves*, and *trust*.

Frequencies Compared

The researcher also compared the frequency counts from the definition taxonomy and the article titles. Table 30 shows the overlap between words with a frequency of 10 or greater. *Def (#)* and *SM (#)* indicate the corresponding count in the respective list if the count was less than 10. A count of (0) means the word did not exist in the opposing data set. An *x* indicates word overlap.

Table 30: Word Frequency Comparison

Subject Matter (SM)		**Overlap**		**Definitions (Def)**	
information	40	x	SM (8)	computer	35
privacy	38	Def (8)	x	ethical	35
ethical	34	x	x	ethics	34
ethics	33	x	x	technology	28
social	30	x	x	moral	22
technology	26	x	SM (4)	use	21
moral	20	x	x	information	19
communication	13	Def (6)	SM (0)	problems	19
ICT	13	Def (6)	x	issues	18
systems	13	x	SM (4)	values	16
virtual	13	Def (0)	SM (8)	computing	15
digital	12	Def (4)	SM (2)	computers	14
implications	12	Def (4)	SM (2)	professional	14
internet	12	Def (5)	x	social	13
issues	12	x	SM (0)	applied	12
trust	12	Def (1)	SM (0)	standards	12
engineering	11	Def (2)	SM (2)	policies	11
new	11	x	x	systems	11
rights	10	Def (2)	SM (1)	decisions	10
software	10	Def (5)	SM (0)	human	10
–			x	new	10

Nine individual words overlap in the comparison: information, ethical, ethics, social, technology, moral, systems, issues, and new. *New* is interesting in that it indicates a conceptual focus on emergence (broadly defined) in computing. The only subject matter word that did not exist in the definition taxonomy was *virtual*. The definition words that did not exist in the article titles were *problems*, *applied*, and *standards*. Article authors refrain from using the term *problems*, and prefer to use terms such as *issues* and *implications*. The same is true for *standards*, as authors use related terms such as *values*, *principles*, or *codes*, which have less of an authoritative tone. The non-use of *applied* in the subject matter was surprising, given the word's heavy use in relation to computing ethics as a discipline.

Table 31 presents combined frequencies for words sharing the same root. The top ten combinations indicate concept saturation based on terminology. The comparison is evidence that root-based word frequency counts can give a researcher compelling evidence of patterns in contextual data sets. Eight of the ten word combinations top the list in both data sets. Unsurprisingly, in both cases the most used words were those sharing the root *ethic*.

Table 31: Word Frequency Comparison by Shared Root

Subject Matter (SM)		**Overlap**		**Definitions (Def)**	
ethical, ethically, ethics	68	x	x	ethical, ethically, ethics	70
information	40	x	x	computer(s), computing, computational	65
social, socially, society	40	x	x	use, usage, used, user(s), using	34
privacy	38	Def (8)	x	technology(ies)	33
technology(ies)	35	x	SM (5)	profession, professional(s)	26
design, designing, development, developing	26	x	x	social, society, sociology	24
moral	20	x	x	moral	22
use, used, user(s), uses, using	19	x	SM (0)	problem(s)	21
ICT(s)	18	x	x	design, develop(s), developed, developing, development	20
computer(s), computing	18	x	x	information	19

The only subject matter word that did not exist as a top definition count was *privacy*. Though *privacy* did exist in the definition frequency list with a count of eight. The only two definition words that did not exist as top subject matter counts were *profession(als)* and *problem(s)*. *Profession(als)* did exist in the subject matter frequency list, but with a count of five. Again, the words *problem* and *problems*, though used in definition content, were not used in article titles. Based on a *manifest* (directly observable) view of the data, the definitions of computing ethics and the subject matter of computing ethics converge on the following patterns:

1. Ethical (138)
2. Computing (83)
3. Technology (68)
4. Social (64)
5. Information (59)
6. Use (53)
7. Design and Development (46)
8. Moral (42)

The top two combined frequencies literally verify the topic of discussion in the definitions and articles: *computing ethics*. Additionally, the manifest occurrences are categorical. Ethical, social, and moral are ontological. Computing, technology, and information are artifactual. Use and design/development are verbal. Aside from ontology and artifacts of computing, computing ethics is most concerned with the use and design/development of computing technology.

Thematic Coherence

This analysis has already established thematic coherence at the macro level, but the coherence deserves some concluding remarks. The definition themes provided a reliable framework for organizing the subject matter patterns. The themes required no modification when used for the subject matter analysis. The definition proved broad enough for the wide-ranging journal content. Substantial qualitative and quantitative overlap existed between the definition taxonomy and the subject matter of computing ethics. In conclusion, this analysis has provided a view of what computing ethics *is*. This analysis has also provided a coherent thematic definition of computing ethics for use in education and research.

CHAPTER 5: CONCLUSION

> *Theory and Practice – Finally, if we can discover ethical principles these ought to give some guidance for the unsolved problems of life, which continually present themselves for decision. Whatever may be true for other sciences it would seem that ethics at least ought to have some practical value…Man must act; and he must act well or ill, rightly or wrongly. If he has reflected, has considered his conduct in the light of the general principles of human order and progress, he ought to be able to act more intelligently and freely, to achieve the satisfaction that always attends on scientific as compared with uncritical or rule-of-thumb practice. Socrates gave the classical statement for the study of conduct when he said, "A life unexamined, uncriticized, is not worthy of man."*
> (Dewey & Tufts, 1906, pp. 4-5)

Conclusion Overview

This chapter presents the conclusions of the study intended to 1) synthesize a definition of computing ethics, 2) determine the subject matter of computing ethics, and 3) examine the relationship between the definition and subject matter. Concluding topics are discussed including computing community worldviews, limitations, delimitations, study importance, and future research.

Computing Community Worldviews

This study introduced *computing* by discussing the definition as proposed by ACM. The researcher expanded on the computing definition in order to denote members of the *computing community*. This study proposed that the computing community is composed of the formal fields of CS, CE, IT, IS, and SWE, along with all scholars and practitioners whose work relates directly to the field of computing, including computing ethicists.

Each subfield, or group, within the broader computing community has a unique worldview. The worldviews are drivers of consensus and debate. For example, the business oriented IS and IT scholars may see ACM as a more traditional CS organization, and thus might disagree with the ACM definition of computing or other conceptual and practical issues. Computing ethicists from a philosophical tradition might disagree with SWE practitioners on matters of ethical analysis, and so on.

However, all the subfields share a fundamental relationship with computing technology. Computing, and its study, sustains each field. The fields rely on one another for discipline growth. The researcher believes the groups within the computing community can find common ground, even on such a difficult and complex matter as ethics. This study assumed consensus was possible, and thus the computing ethics definition derived from the multi-disciplinary data is useful no matter the worldview. The subject matter analysis presented similar and different themes of interest in computing journals with divergent worldviews. Yet, the applicability of the computing ethics definition to the subject matter data is evidence that consensus is achievable.

Limitations

Limitations are aspects of a research study that the researcher cannot control. The most notable limitation on this study was the time limitation. Program-based time constraints required the researcher to sample the journal article data. However, given the time limitation, the sample satisfied the needs of the project. The sample data set allowed the researcher to answer the research questions and the full data set will provide the researcher with future research opportunities.

Though the researcher made every effort to collect as many explicit definitions of computer ethics as possible, the researcher acknowledges that others likely exist, but were not found. However, the definitions included in the study were varied and resulted in a framework that is both comprehensive and scalable. Existing definitions will either fit within the framework or the framework can be expanded to include additional elements.

The subject matter patterns are limited to the timeframe examined: 2009-2012. The patterns cannot be generalized over the life of the journals. Based on initial analysis, the patterns shift over time. For example, in *IEEE Technology and Society Magazine*, throughout the 1980's *nuclear* was a significant pattern, although that is not the case in the other three journals. Interestingly, one of the computer ethics definitions included the phrase *nuclear ethics* and therefore that code exists as part of definition taxonomy and thematic map.

Delimitations

Delimitations are aspects of a research study that the researcher can control. The notable delimitation in this study was the choice of the researcher to not involve other coders (raters) in the qualitative analysis. However, the researcher partially considers the non-inclusion of other coders as a limitation since this study is a dissertation, which is inherently based on solo (but guided) work. The typical reality for a dissertation is that no one else, whether appropriate or not, is going to spend the same amount of time coding and establishing the same level of intimacy with the data as the dissertation writer. Thus, this study offers one interpretation of the data.

Though inter-rating is more common in quantitative content analysis, the researcher acknowledges that involving other coders does provide some reassurance of results, but does not mean more validity or reliability than other methods of verification. Studies such as (Armstrong, Gosling, Weinman, & Martaeu, 1997) have discussed the place of inter-rater reliability in qualitative studies. The findings of (Armstrong et al., 1997) suggested that although some useful reasons to include inter-rater reliability in a qualitative study might exist, more important verification issues are at stake. "Contamination" happens at earlier points in a study (Armstrong et al., 1997). Examples include the research questions being asked, the data sources collected, and the training of raters. To expound upon an example, training another researcher to examine a fragment of text and examine it as the primary researcher would "does not establish that the codes are objective but merely that two people can apply the same subjective perspective to the text" (Marks & Yardley, 2004, p. 62).

The researcher agrees with (Morse et al., 2002) that,

> Research is only as good as the investigator. It is the researcher's creativity, sensitivity, flexibility and skill in using the verification strategies that determines the reliability and validity of the evolving study. For example, ongoing analysis results in the dynamic formulation of conjectures and questions that force purposive sampling. (Morse et al., 2002, p. 17)

Therefore, the researcher did not involve other coders, but rather concentrated on foundational forms of validity and reliability as discussed in "Chapter 3: Methodology." The research data is included in the Appendices so that other researchers may conduct analysis if desired. Also, the results of this study are subject to further testing and analysis.

Future Research

A number of future research opportunities, specifically related to this study, have emerged regarding computing ethics. The subject matter analysis was limited to 2009-2012; therefore an analysis of all article data from the selected journals would give a more comprehensive view of the subject matter and disclose pattern shifts over time. Another area for study related to the articles is the network of authorship and influence in the sphere of computing ethics. The researcher also collected additional data artifacts in the preliminary phases of this study for future analysis that follows the same methodological approach. The data sets include anthologies, textbooks, codes of ethics, and curriculum models related to computing ethics. Finally, the latent meta-stance hierarchy (Figure 2) that emerged during the collection of computer ethics definitions deserves further exploration. In sum, this study has established a well-qualified ethical foundation and consequently has increased research possibilities.

Study Importance

This study offers the computing community a new definition of computing ethics. Such a definition is foundational to computing ethics education and research. This study was the first methodological effort to synthesize a definition based on the discourse of computing ethics. The definition offered is interdisciplinary, scalable, and practical. This study answered the calls for a "widened" definition (Górniak-Kocikowska, 1996), while remaining professionally focused (Gotterbarn, 1991). Bynum (2001a, 2011) asserted that Moor's 1985 definition of computer ethics was the "best available" and that Moor's account was "broader and more ambitious" than previous attempts at definition. The researcher, by means of this study, has at the least challenged and at the most redirected both sentiments. This study also addressed the calls for a "coherent concept" of the subject matter of computing ethics (Maner, 1996). In a broader sense, this study supports efforts toward ethical thinking and action in computing, and in society.

As discussed in the literature review, a faculty member from the Dark and Winstead (2005) study stated, "A common definition of ethics is 'doing what is right when no one is looking'" (p. 27). Educators and researchers risk passing such naive and erroneous sentiments on to students. In the Dexter et al. (2013) study, students generally believed that they understood what computer ethics is. Computing faculty are likely to believe the same.

When asked to define ethics in (Dexter et al., 2013), top student themes were as follows: doing right, morality, decision-making, codes of conduct, common good, and religion. Three of the student definition themes match definition codes derived in this study: morality, decision-making, and codes of conduct. Also, four of the student definition themes match subject matter codes derived in this study: morality, decision-making, codes of ethics, and good. When asked to provide an example of a major ethical issue in the students' profession, the themes most frequently cited were as follows: collecting and storage of personal data, copyright infringement vs. fair use, business concerns, access to information, piracy, plagiarism, and licensing (Dexter et al., 2013). Three of the ethical issues raised by students match definition codes derived in this study: collecting and storing data, information access, and piracy. Also, three of the ethical issues raised by students match subject matter codes derived in this study: data protection/dataveillance, access to information, and plagiarism.

Though the student sample in (Dexter et al., 2013) was relatively small, the comparative results suggest that computing ethics education has a good start, but more work remains. Educators and researchers must seriously consider the definition and subject matter of computing ethics. Educators and researchers must purposefully commit to the understanding and dissemination of computing ethics' qualities. This study contributes to the understanding and dissemination of *computing ethics*.

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APPENDIX A: DEFINITIONS

(Maner, 1980, org. 1978) – *Starter Kit on Teaching Computer Ethics*

Walter Maner defined the field as one which examines "ethical problems aggravated, transformed or created by computer technology," and focused attention upon applications of traditional ethical theories used by philosophers doing "applied ethics," especially analyses using the utilitarian ethics of the English philosophers Jeremy Bentham and John Stuart Mill, or the rationalist ethics of the German philosopher Immanual Kant. Also see (Bynum & Rogerson, 2003, p. 17) and (Bynum, 2001a).

(Johnson, 1985) – *Computer Ethics, 1st edition*

Computer ethics studies the way in which computers "pose new versions of standard moral problems and moral dilemmas, exacerbating the old problems, and forcing us to apply ordinary moral norms in uncharted realms" (p. 1).

Like Maner before her, Johnson recommended the "applied ethics" approach of using procedures and concepts from utilitarianism and Kantianism. See (Bynum & Rogerson, 2003, p. 17) and (Bynum, 2001a).

(Moor, 1985) – *What is Computer Ethics?*

On my view, *computer ethics* is the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology. I use the phrase "computer technology" because I take the subject matter of the field broadly to include computers and associated technology. For instance, I include concerns about software as well as hardware and concerns about networks connecting computers as well as computers themselves. A typical problem in computer ethics arises because there is a policy vacuum about how computer technology should be used. Computers provide us with new capabilities and these in turn give us new choices for action. Often, either no policies for conduct in these situations exist or existing policies seem inadequate. A central task of computer ethics is to determine what we should do in such cases, i.e., to formulate policies to guide our actions. Of course, some ethical situations confront us as individuals and some as a society. Computer ethics includes consideration of both personal and social policies for the ethical use of computer technology…Indeed, much of the important work in computer ethics is devoted to proposing conceptual frameworks for understanding ethical problems involving computer technology…On my view, computer ethics is a dynamic and complex field of study which considers the relationships among facts, conceptualizations, policies and values with regard to constantly chaining technology…Computer ethics requires us to think anew about the nature of computer technology and our values…The challenge for computer ethics is to formulate policies which will help us deal with this dilemma. We must decide when to trust computers and when not to trust them. (Moor, 1985, pp. 266-275)

(Gotterbarn, 1991) – *Computer Ethics: Responsibility Regained*

Ethics for computing professionals is not another kind of ethics but it is ethical values, rules and judgments applied in a computing context based on professional standards and a concern for the user of the computing artifact…The starting point of computer ethics should be organized around the standards for the way software is developed. (p. 6)

Discussions of professional computer ethics are almost non-existent in the general literature. There is little attention paid to the domain of professional ethics -- the values that guide the day to day activities of computing professionals in their role as professionals. By computing professional I mean anyone involved in the design and development of computer artifacts. Computer artifacts include things like: program documentation, test plans and test cases, feasibility studies, source code, user manuals, system maintenance manuals and design documents, that is, all the products of the system development process. The ethical decisions made during the development of these artifacts have a direct relationship to many of those issues discussed under the broader concept of computer ethics. (p. 4)

THE COMPUTING PROFESSIONAL - What is involved in being a professional? When I present myself in the role of a computer professional to you, I say that I have the skill, the talent and the experience to do this job well and I say that I have the moral commitment to a set of moral values and a derivative commitment to a set of standards about software development. That is computer ethics. There is a commitment to the user. …
There are standards for developing computing artifacts which, when tempered by professional values, are the domain of computer ethics. We can talk about the way in which we write code, the way in which we produce documentation as ethical issues. With this narrower focus on computer ethics we can provide some standards about the way computing is done. (p. 8)

The focus of this approach to computer ethics is on the individual professional's responsibility in the practice of his craft. As the standards of this craft are being developed, so are the standards of professional computer ethics. The judgments about these standards will be guided by the values of the professional. (p. 9)

Computer ethics as presented here gives a clear description of the relation of values to the work of the computer professional and sets forth criteria for making ethical decisions in that process. (p. 9)

(Bynum, 1992) – *Computer Ethics in the Computer Science Curriculum*

The term "computer ethics" has acquired a broader sense that includes applied ethics, sociology of computing, technology assessment, computer law, and related fields.

This broader kind of computer ethics examines the impact of computing and information technology upon human values, using concepts, theories and procedures from philosophy, sociology, law, psychology, and so on. Practitioners of the broader computer ethics – whether they are philosophers, computer scientists, social scientists, public policy makers, or whatever – all have the same goal: To integrate computing technology and human values in such a way that the technology advances and protects human values, rather than doing damage to them.

(Pierce & Henry, 1996) – *Computer Ethics: The Role of Personal, Informal, and Formal Codes*

The definition of ethics proposed by Johnson (1985) was adopted for this study. Thus, computer ethics refers to a set of rules or principles used for moral decision making regarding computer technology and computer use. Moreover, the focus of the present discussion is the basis of the rules individuals apply when making decisions involving computer technology and computer use. (p. 425)

(Moor, 1998) – *Reason, Relativity, and Responsibility in Computer Ethics*

Computer ethics has two parts: (i) the analysis of the nature and social impact of computer technology and (ii) the corresponding formulation and justification of policies for the ethical use of such technology. I use the phrase "computer technology" because I take the subject matter of the field broadly to include computers and associated technology including software, hardware, and networks. (p. 16)

(Floridi, 1999) – *Information Ethics: On the Philosophical Foundation of Computer Ethics*

CE shares with other philosophical disciplines in the analytic tradition three important but rather too general features:

1. it is logically argumentative, with a bias for analogical reasoning
2. it is empirically grounded, with a bias for scenarios analysis, and
3. it endorses a problem solving approach.

Besides 1–3, CE also presents a more peculiar aspect, which has so far acted as its driving force, namely:

4. it is intrinsically decision-making oriented.

Technological changes have outpaced ethical developments, bringing about unanticipated problems that have caused a "policy vacuum" (Moor, 1985) filled by CE, which has initially surfaced from practical concerns arising in the information society. Rational decisions have to be taken, technical, educational and ethical problems must be solved, legislation needs to be adopted, and a combination of empirical evidence and logical arguments seems to provide the most obvious and promising means to achieve such pressing goals. A rather more interesting point is that 1–4 constitute the theoretical justification of CE's present inductive methodology, which leads us to:

5. it is based on case studies.

During the last two decades, CE has consistently adopted a bottom-up procedure, carrying out an extended and intensive analysis of individual cases, amounting very often to real-world issues rather than mental experiments. Its aim has been to reach decisions based on principled choices and defensible ethical principles and hence to provide more generalised conclusions – in terms of conceptual evaluations, moral insights, normative guidelines, educational programs or legal advice – which might apply to whole classes of comparable cases. (pp. 37-38)

Instead, CE develops its analyses, and attempts to indicate the best course of action, as a consequence of the steady and careful attention paid to what happens to the information environment. Right and wrong, in CE, do not just qualify actions in themselves, they essentially refer to what is eventually better or worse for the infosphere. Therefore, far from being a classic, action-oriented ethics, as it may deceptively seem at first sight, CE is primarily an ethics of *being* rather than *conduct* or *becoming*, and hence qualifies as non-standard ethics. The fundamental difference, which sets it apart from all other members of the same class of theories, is that CE raises information as such, rather than just life in general, to the role of the true and universal patient of any action, thus presenting itself as an infocentric and object-oriented, rather than just a biocentric and patient-oriented ethics…And since any form of being, is, in any case, also a coherent body of information, to say that CE is infocentric is tantamount to interpreting it, correctly, as an ontocentric object-oriented theory. (pp. 42-43)

(Bowyer, 2000) – *Ethics and Computing: Living Responsibly in a Computerized World*

Professional ethics can be different from general ethics to the extent that professional ethics must take into account:

- relations between practicing professionals and their clients,
- relations between the profession and society in general,
- relations among professionals,
- relations between employee and employer, and perhaps most importantly,
- specialized technical details of the profession. (p. 3)

(Brey, 2000b) – *Method in Computer Ethics: Towards a Multi-level Interdisciplinary Approach*

In his by now classical essay "What is computer ethics?" Jim Moor proposed that the central aim of computer ethics is to formulate policies to guide individual and collective action in the use of computer technology (Moor 1985). I agree with this proposal, with the addition that not just the use of computer technology, but also other practices that involve computing technology, such as its development or management, require the formulation of policy guidelines. When we conceive of computer ethics in this way, it is clear that it is a branch of applied ethics. Whereas its counterpart, theoretical ethics, is concerned with general aspects of morality, applied ethics is concerned with the study of morality in particular domains of human practice. Moreover, the aim of applied ethics is not merely to arrive at well-supported moral analysis, but also to use such analyses to affect the discourse, policies and practices that are prevalent in its domain of study. The scope of computer ethics includes individual and collective practices that somehow essentially involve computers. This includes practices like the use, development, regulation, management, advocacy and advertisement of computer technology. Also included should be the products of such actions, e.g., computer systems and software, manuals, advertisements, and laws and policies regulating the use of computers. These products deserve special mention because their moral properties may be analyzed independently from a consideration of the actions that have lead to them. (p. 125)

(Bynum, 2001a) – *Computer Ethics: Basic Concepts and Historical Overview*

The term "computer ethics" is open to interpretations both broad and narrow. On the one hand, for example, computer ethics might be understood very narrowly as the efforts of professional philosophers to apply traditional ethical theories like utilitarianism, Kantianism, or virtue ethics to issues regarding the use of computer technology. On the other hand, it is possible to construe computer ethics in a very broad way to include, as well, standards of professional practice, codes of conduct, aspects of computer law, public policy, corporate ethics--even certain topics in the sociology and psychology of computing…Computer ethics in the broadest sense can be understood as that branch of applied ethics which studies and analyzes such social and ethical impacts of information technology.

No matter which re-definition of computer ethics one chooses, the best way to understand the nature of the field is through some representative examples of the issues and problems that have attracted research and scholarship. Consider, for example, the following topics:

- 3.1 Computers in the Workplace
- 3.2 Computer Crime
- 3.3 Privacy and Anonymity
- 3.4 Intellectual Property
- 3.5 Professional Responsibility
- 3.6 Globalization
- 3.7 The Metaethics of Computer Ethics

(Floridi & Sanders, 2002) – *Mapping the Foundational Debate in Computer Ethics*

Computer Ethics (CE) stems from practical concerns arising in connection with the impact of Information and Communication Technologies (ICT) on contemporary society…In order to fill this policy and conceptual vacuum (Moor 1985), CE carries out an extended and intensive study of individual cases, amounting very often to real-world issues rather than mere mental experiments, usually in terms of reasoning by analogy…However, CE's aim is to reach decisions based on principled choices and defensible ethical criteria, and hence to provide more generalised conclusions – in terms of conceptual evaluations, moral insights, normative guidelines, educational programs, legal advice, industrial standards and so forth – which may apply to whole classes of comparable cases. So, at least since the seventies (see Bynum 2000 for earlier works in CE), CE focus has moved from problem analysis – primarily aimed at sensitising public opinion, professionals and politicians – to tactical solutions resulting, for example, in the evolution of professional codes of conduct, technical standards, usage regulations, and new legislation. The constant risk of this bottom-up procedure has remained the spreading of ad hoc or casuistic approaches to ethical problems. Prompted partly by this difficulty, partly by a natural process of self-conscious maturation as an independent discipline, CE has further combined tactical solutions with more strategic and global analyses. (p. 1)

The various difficulties encountered by other approaches to CE can be reconnected to the fact that, far from being a classic, agent/action-oriented ethics, as it may deceptively seem at first sight, CE is primarily an ethics of *being* rather than conduct or becoming, and hence qualifies as non-standard. The fundamental difference, which sets IE apart from all other members of the same class of non-standard theories, is that in IE information objects as such, rather than just living systems in general, are raised to the role of universal patients of any action…IE suggests that there is something even more elemental than life, namely being, understood as information; and something more fundamental than pain, namely entropy. According to IE, one should also evaluate the duty of any rational being in terms of contribution to the growth of the infosphere, and any process, action or event that negatively affects the whole infosphere – not just an information object – as an increase in its level of entropy and hence an instance of evil…And since any form of being is in any case also a coherent body of information, to say that IE is infocentric is tantamount to interpreting it, correctly, as an ontocentric theory. (p. 8)

(Marturano, 2002) – *The Role of Metaethics and the Future of Computer Ethics*

Computer Ethics studies the ethical implications of Information and Communication Technologies. Canonically Computer Ethics was a discipline born in the early ‘80s with the well-known paper by James Moore (Moore 1985). It’s a field of applied ethics although, many scholars prefer to define Computer Ethics as a field of professional ethics. (p. 71)

Given this taxonomy, computer ethics is a branch of applied ethics…And computer ethics shares many theoretical notions with other branches of applied ethics. For instance, problems regarding human rights or future generations are important for computer ethics…and problems of intellectual property are applying both to software. (p. 73)

Computer Ethics shares general ethical problems with other fields of applied ethics. (p. 77)

(Bynum & Rogerson, 2003): Bynum – *Computer Ethics and Professional Responsibility*

References 1989/1992 Bynum definition.
Computer ethics identifies and analyzes the impacts of information technology on such social and human values as health, wealth, work, opportunity, freedom, democracy, knowledge, privacy, security, self-fulfillment, etc. This very broad view of computer ethics employs applied ethics, sociology of computing, technology assessment, computer law, and related fields. It employs concepts, theories, and methodologies from these and other relevant disciplines. This conception of computer ethics is motivated by the belief that - eventually - information technology will profoundly affect everything that human beings hold dear. (p. 19)

(Shackelford et al., 2006) – *Computing Curricula 2005: The Overview Report*

In the glossary of terms:
Legal / Professional / Ethics / Society – The areas of practice and study within the computing disciplines that help computing professionals make ethically informed decisions that are within the boundaries of relevant legal systems and professional codes of conduct. (p. 54)

(De George, 2006) – *Information Technology, Globalization and Ethics*

Computer ethics and business ethics are usually treated as two different areas of applied ethics. (p. 29)

The task of those in the fields of computer ethics and of business ethics is to clarify the ethical issues involved in these and other areas, and to help promote intellectually honest discussions of these issues for the development of consensus and perhaps appropriate legislation – or changes in existing legislation – on a global scale. (p. 40)

(Górniak-Kocikowska, 2007) – *From Computer Ethics to the Ethics of Global ICT Society*

Instead, global ICT ethics, resulting from collaborative work of scholars active globally, should take on themselves the task of examining the global impact of ICT, especially in terms of the possible harm this technology could cause. ICT ethics should then supply the arguments supporting decisions made in order to prevent the use of ICT in harmful ways; especially regarding people who are on the peripheries of power centers, and who are too powerless and vulnerable to effectively protect themselves from such harm…I am strongly convinced that one of the fundamental tasks of computer ethics/ICT ethics is to be a watch dog, guarding the global society from becoming a society of slaves to the few who – using ICT – can pull the strings of power to their own exclusive advantage. To that purpose, Global ICT Ethics should be an ethics focusing on the dynamics of the relationship between the weak and the strong, the rich and the poor, the healthy and the sick worldwide – and it should explore the ethical problems from the point of view of both parties involved. That way, global ICT ethics can have a truly communicative character, and it can become an ethics that will be both a co-creator and also a result of a democratic processes. (p. 56)

(Stamatellos, 2007) – *Computer Ethics: A Global Perspective*

Computer ethics could be defined as *the systematic study of the ethical and social impact of computers in the information society*. The ethical and social issues under discussion involve the acquisition, distribution, storage, processing, and dissemination of digital data in information systems and how individuals and groups interact with these systems and data. The moral considerations of computer ethics are related to the responsibility and accountability of the computer users and professionals with regard to the design and implementation of information systems. Computer ethics also includes the study of the policies, rules, and legislations that refer to a particular situation and the alternative ethical decisions, as well as the social implications of these alternatives. The ethical problems that arise from information technology could take the following forms: information technology may (1) *exaggerate* traditional ethical problems (e.g., new ways of invading privacy); (2) *convert* already known ethical issues into analogous issues (e.g., change the idea of ownership and intellectual property); and (3) *create* entirely new ethical problems (e.g., computer viruses and hacking). However, as a necessary prerequisite for studying computer ethics, the reader should be aware of the nature of moral judgment and the limitations of ethical decision making in computing…Computer ethics deals with practical problems and focuses on the nature of moral action and responsibility. (pp. 3-4)

(Barger, 2008) – *Computer Ethics: A Case-based Approach*

This book shows that there is indeed an ethics that governs the use of computers. (xiii)

…but for now let us conclude by saying that the words "computer ethics" do not denote the oxymoron spoken of in the Preface of this book. Rather, they symbolize the hope that dilemmas involving one of the world's most complex machines, the computer, can be analyzed with a systematic use of normative value theory. (pp. 6-7)

… I do not believe that computer ethics are qualitatively different from medical ethics or legal ethics or any other kind of professional ethics. Like her also, I believe that the nature of the computer and its operation gives certain dilemmas in computing a difference in degree that approximates a difference in kind and that certainly makes computer ethics a unique field of study. (pp. 13-14)

(Van den Hoven, 2008) – *Moral Methodology in Information Technology*

Computer ethics is a form of applied or practical ethics. It studies the moral questions that are associated with the development, application, and use of computers and computer science. Computer ethics exemplifies, like many other areas of applied and professional ethics, the increasing interest among professionals, public policy makers, and academic philosophers in real-life ethical questions. (p. 49)

(Floridi, 2009) – *Network Ethics: Information and Business Ethics in a Networked Society*

In recent years, IE has emerged as the theoretical foundation of applied computer ethics (Floridi, 1999a), the discipline that deals with ICT-based ethical issues (Moor, 1985). (p. 650)

(Johnson, 2009) – *Computer Ethics, 4th edition*

…the field of computer ethics focuses specifically on the role of IT in constituting the moral world. (pp. 21-22)

...IT ethics informs the broader study of technology and ethics. (p. 22)

…task of computer ethics is, then, to evaluate the new possibilities and fill the policy vacuums. (p. 22)

A significant component of this task is addressing conceptual muddles. (p.22)

...in IT ethics we highlight and pay special attention to the role of IT as one of many elements that come into play in moral practices, decisions, and outcomes. Thus, it seems best to say that IT ethics is a subfield of ethics. (p. 22)

The approach taken here is practical. Ethics is understood here to refer to a way of looking at human conditions and interactions using a set of concepts and theories that are distinctively normative. Ethics is a normative lens through which to view human arrangements, choices, and actions. (p. 25)

Our more modest goal here is to provide analysis that informs (although does not necessarily dictate) decision and action. (p. 25)

computer ethics can play a role in identifying ethical issues in both design processes and design features. After design and introduction, IT continues to contribute to the configuration of social arrangements, social practices, and social institutions…The lens of ethics should be brought to bear on all of these stages in the lifecycle of IT. (pp. 12-13)

Often the ethical implications are intertwined with other dimensions of life - legal, economic, religious, political. (p. 26)

(Sicart, 2009) – *The Ethics of Computer Games*

Computer ethics is the field studying the ethical implications that the use of Internet communication technologies and computational technologies create, determining if those ethical issues are new problems or just reiterations of old problems. (p. 16)

(Floridi, 2010) – *The Cambridge Handbook of Information and Computer Ethics*

Information and Communication Technologies (ICTs) have profoundly altered many aspects of life, including the nature of entertainment, work, communication, education, health care, industrial production and business, social relations and conflicts. As a consequence, they have had a radical and widespread impact on our moral lives and hence on contemporary ethical debates. Consider the following list: PAPA (privacy, accuracy, intellectual property and access); 'the triple A' (availability, accessibility and accuracy of information); ownership and piracy; the digital divide; infoglut and research ethics; safety, reliability and trustworthiness of complex systems; viruses, hacking and other forms of digital vandalism; freedom of expression and censorship; pornography; monitoring and surveillance; security and secrecy; propaganda; identity theft; the construction of the self; panmnemonic issues and personal identity; new forms of agency (artificial and hybrid), of responsibility and accountability; roboethics and the moral status of artificial agents; e-conflicts; the re-prioritization of values and virtues…these are only some of the pressing issues that characterize the ethical discourse in our information societies. They are the subject of information and computer ethics (ICE), a new branch of applied ethics that investigates the transformations brought about by ICTs and their implications for the future of human life and society, for the evolution of moral values and rights, and for the evaluation of agents' behaviours. (p. ix)

(Luppicini, 2010) – *Technoethics and the Evolving Knowledge Society: Ethical Issues in Technological Design, Research, Development, and Innovation*

Computer and Engineering Technoethics represents a branch of Technoethics concered with the ethical aspects of computer technology and engineering in contemporary life and society. Key topic areas of include computer environmental technoethics, military technoethics, nanoethics, nuclear ethics, etc. This branch of Tehnoethics draws on work in computer ethics and the concern with human use of computer technology in a number of areas (i.e., computing in the workplace, graphic interfaces, visual technology, artificial intelligence, and robotics)…This branch also draws on engineering ethics and public concern over large scale research and innovation (I.,e., military operations and nanotechnology research). It focuses on the conduct of engineers and their moral responsibilities to the public in areas where new scientific and technological innovations give rise to conflicting societal needs as reflected in public and media… Information and Communication Technoethics represents a branch of Technoethics concerned with the ethical aspects connected to information and communication technology. Key topics include cyberethics, cyber pornography, cybercrime, cyber-stalking, internet ethics, media ethics, netiquette, etc)… Other core characteristics of this branch include communication processes and ethical issues connected to mass media and communication technology. (pp. 97-98)

(O'Brien & Marakas, 2010) – *Introduction to Information Systems*

Business/IT Security, Ethics, Society
The use of information technologies in business has had a major impact on society and thus raises ethical issues in the areas of crime, privacy, individuality, employment, health, and working conditions. (p. 454)

Technology Ethics
Another important ethical dimension deals specifically with the ethics of the use of any form of technology For example, Figure 11.4 outlines four principles of technology ethics. These principles can serve as basic ethical requirements that companies should meet to help ensure the ethical implementation of information technologies and information systems in business. (p. 458)

Principles (11.4)
- Proportionality. The good achieved by the technology must outweigh the harm or risk. Moreover, there must be no alternative that achieves the same or comparable benefits with less harm or risk.
- Informed Consent. Those affected by the technology should understand and accept the risks.
- Justice. The benefits and burdens of the technology should be distributed fairly. Those who benefit should bear their fare share of the risks, and those who do not benefit should not suffer a significant increase in risk.
- Minimized Risk. Even if judged acceptable by the other three guidelines, the technology must be implemented so as to avoid all unnecessary risk.

(Bynum, 2011) – *Computer and Information Ethics*

“Computer and information ethics”, in the broadest sense of this phrase, can be understood as that branch of applied ethics which studies and analyzes such social and ethical impacts of ICT. The present essay concerns this broad new field of applied ethics.

The more specific term “computer ethics” has been used to refer to applications by professional philosophers of traditional Western theories like utilitarianism, Kantianism, or virtue ethics, to ethical cases that significantly involve computers and computer networks. “Computer ethics” also has been used to refer to a kind of professional ethics in which computer professionals apply codes of ethics and standards of good practice within their profession. In addition, other more specific names, like “cyberethics” and “Internet ethics”, have been used to refer to aspects of computer ethics associated with the Internet.

No matter which re-definition of computer ethics one chooses, the best way to understand the nature of the field is through some representative examples of the issues and problems that have attracted research and scholarship. Consider, for example, the following topics:

- 2.1 Computers in the Workplace
- 2.2 Computer Crime
- 2.3 Privacy and Anonymity
- 2.4 Intellectual Property
- 2.5 Professional Responsibility
- 2.6 Globalization
- 2.7 The Metaethics of Computer Ethics

(Baase, 2012) – *A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology*

Chapter 9 Professional Ethics and Responsibilities
9.1 What Is “Professional Ethics”?

The scope of the term “computer ethics” varies considerably. It can include such social and political issues as the impact of computers on employment, the environmental impact of computers, whether or not to sell computers to totalitarian governments, use of computer systems by the military, and the impact of new applications on privacy. It can include personal dilemmas about what to post on the Internet and what to download. In this chapter, we focus more narrowly on a category of professional ethics, similar to medical, legal, and accounting ethics, for example. We consider ethical issues a person might encounter as a computer professional, on the job. Professional ethics includes relationships with and responsibilities toward customers, clients, coworkers, employees, employers, people who use one’s products and services, and others whom one’s products affect. We examine ethical dilemmas and guidelines related to actions and decisions of individuals who create and use computer systems. We look at situations where you must make critical decisions, situations where significant consequences for you and others could result. (p. 404)

(Tavani, 2012) – *Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing*

Before we propose a definition of cyberethics, it is important to note that the field of cyberethics can be viewed as a branch of (applied) ethics...For our purpose, cyberethics can be defined as the study of moral, legal, and social issues involving cybertechnology. Cyberethics examines the impact of cybertechnology on our social, legal, and moral systems, and it evaluates the social policies and laws that have been framed in response to issues generated by its development and use…Cybertechnology, as used throughout this textbook, refers to a wide range of computing and communication devices, from stand-alone computers to connected, or networked, computing and communication technologies. (pp. 3-4)

(Valacich & Schneider, 2013) – *Information Systems Today: Managing in the Digital World*

Computer ethics is used to describe moral issues and standards of conduct as they pertain to the use of information systems. In 1986, Richard O. Mason wrote a classic and very insightful article on the issues central to this debate - information privacy, accuracy, property, and accessibility (aka, "PAPA")…With the societal changes brought about by information systems, the issues surrounding privacy have moved to the forefront of public concern; in addition the ease of digitally duplicating and sharing information has not only raised privacy concerns, but also issues related to intellectual property.

- Information privacy
- email privacy
- Internet (online privacy)
- notice/awareness
- choice/consent
- access/participation
- integrity/security
- enforcement/redress
- intellectual property
- the human cost
- code of ethical conduct
- responsible computer use
- the digital divide (p. 33)

Glossary:
Computer ethics: A broad range of issues and standards of conduct that have emerged through the use and proliferation of information systems.

APPENDIX B: DEFINITION HIERARCHIES

(Maner, 1980, org. 1978) – *Starter Kit on Teaching Computer Ethics*

computer ethics…
- is a field which
    - examines
        - ethical problems
            - aggravated
            - transformed
            - created
                - by computer technology
- is applied using
    - traditional ethical theories used by
        - philosophers doing applied ethics like
            - utilitarian ethics (Bentham and Mill)
            - rationalist ethics (Kant)

(Johnson, 1985) – *Computer Ethics, 1st edition*

computer ethics…
- studies
    - the way in which computers
        - pose new versions of standard moral problems
        - pose moral dilemmas
        - exacerbate the old problems
        - force us to apply ordinary moral norms in uncharted realms
- should use applied approach of using
    - procedures
    - concepts
        - of utilitarianism
        - of Kantianism

(Moor, 1985) – *What is Computer Ethics?*

computer ethics…
- is the
  - analysis of
    - the nature
    - social impact
      - of computer technology
  - formulation
  - justification
    - of policies for
      - the ethical use of
        - computer technology
- subject matter includes
  - computers
  - associated technology
  - software
  - hardware
  - networks
- has the central task of
  - formulating policies to
    - guide our actions when
      - policies do not exist
      - policies are inadequate
        - for conduct in situations created by
          - new capabilities
          - new choices for action
            - due to computers
  - proposing conceptual frameworks for
    - understanding ethical problems involving
      - computer technology
- is a field of study which is
  - dynamic
  - complex
  - considers relationships among
    - facts
    - conceptualizations
    - policies
    - values
      - with regard to changing technology
  - field of substantial practical importance
- requires
  - new thinking about
    - the nature of
      - computer technology
      - our values
- challenge is to
  - formulate policies which
    - help us deal with dilemmas

(Gotterbarn, 1991) – *Computer Ethics: Responsibility Regained*

computer ethics, professional computer ethics…

- is
    - ethical values
    - rules
    - judgments
        - applied in a computing context based on
            - professional standards
            - concern for the user of the computing artifact
- should be
    - organized around
        - the standards of software development

- is
    - the values that
        - guide activities of
            - computing professionals in
                - their role of
                    - design
                    - development
                        - of computer artifacts like
                            - program documentation
                            - test plans
                            - test cases
                            - feasibility studies
                            - source code
                            - user manuals
                            - system maintenance manuals
                            - design documents
                            - all products of the system dev process
- has a direct relationship with
    - ethical decisions made during
        - development of computing artifacts
- is
    - a computer professional stating they have
        - the skill
        - the talent
        - the experience
            - to do a job well
        - the moral commitment to
            - a set of moral values
        - a derivative commitment to
            - a set of standards about software development
        - a commitment to the user
- domain is
    - standards for developing computing artifacts which
        - are tempered by professional values

(Gotterbarn, 1991) continues

(Gotterbarn, 1991) continued

- narrow focus on
  - writing code
  - producing documentation
- focus is on
  - individual professional responsibility in
    - the practice of the craft
- standards are
  - developing as
    - the standards of the craft are developed
- describes
  - the relation of values to
    - professional work
- sets forth
  - criteria for
    - making ethical decisions during
      - the process

(Bynum, 1992) – *Computer Ethics in the Computer Science Curriculum*

computer ethics…

- is a term that
    - has acquired a broad sense
- is a field that includes
    - applied ethics
    - sociology of computing
    - technology assessment
    - computer law
    - related fields
- examines
    - impact of
        - computing and information technology
            - on human values
            - using concepts
            - using theories
            - using procedures
                - from philosophy
                - from sociology
                - from law
                - from psychology
                - and so on
- has practitioners including
    - philosophers
    - computer scientists
    - social scientists
    - public policy makers
    - or whatever
- practitioners have the goal to
    - integrate technology and human values
    - advance technology
    - protect human values
    - not damage human values

(Pierce & Henry, 1996) – *Computer Ethics: The Role of Personal, Informal, and Formal Codes*

computer ethics…

- refers to
    - a set of
        - rules
        - principles
            - used for moral decision making regarding
                - computer technology
                - computer use

(Moor, 1998) – *Reason, Relativity, and Responsibility in Computer Ethics*

computer ethics…
- is the
    - analysis of
        - the nature of
        - the social impact of
            - computer technology
    - formulation
    - justification
        - of policies for
            - the ethical use of
                - computer technology which includes
                    - computers
                    - associated technology
                    - software
                    - hardware
                    - networks

(Floridi, 1999) – *Information Ethics: On the Philosophical Foundation of Computer Ethics*

computer ethics…
- shares features with
    - philosophical disciplines
- is logically argumentative with
    - bias for analogical reasoning
- is empirically grounded with
    - bias for scenario analysis
- endorses
    - a problem solving approach
- is intrinsically decision-making oriented
- fills
    - policy vacuums
- surfaced from
    - practical concerns in
        - information society
- has goals of
    - making rational decisions
    - solving technical problems
    - solving educational problems
    - solving ethical problems
    - adopting legislation
- is based on case studies

(Floridi, 1999) continues

(Floridi, 1999) continued

- adopted
    - a bottom-up procedure
- carries out
    - extended analysis
    - intensive analysis
        - of individual cases
- aims to
    - reach decisions based on
        - principled choices
        - defensible ethical principles
    - provide generalized conclusions in terms of
        - conceptual evaluations
        - moral insights
        - normative guidelines
        - educational programs
        - legal advice
- develops
    - analyses
- attempts to
    - indicate the best course of action as a consequence of
        - steady attention
        - careful attention
            - to what happens in
                - the information environment
- is an ethics of *being* hence
    - qualifies as non-standard
- raises
    - information to the role of
        - the true patient
        - the universal patient
            - of any action
- presents itself as an
    - infocentric ethics
    - object-oriented ethics
    - ontocentric object-oriented theory

(Bowyer, 2000) – *Ethics and Computing: Living Responsibly in a Computerized World*

ethics and computing, professional ethics…
- takes into account
    - relations between/among
        - practicing professionals and their clients
        - the profession and society in general
        - professionals
        - employee and employer
    - specialized technical details of the profession

(Brey, 2000b) – *Method in Computer Ethics: Towards a Multi-level Interdisciplinary Approach*

computer ethics…
- has a central aim to
    - formulate policies
    - guide individual action
    - guide collective action
- is a branch of
    - applied ethics with an aim to
        - arrive at well-supported moral analysis
        - use analyses
        - affect discourse
        - affect policies
        - affect practices
- has a scope of
    - individual practice that essentially involves computers
    - collective practice that essentially involves computers
        - use
        - development
        - regulation
        - management
        - advocacy
        - advertisement
            - of computer technology
    - products of practice
        - computer systems
        - computer software
        - manuals
        - advertisements
        - laws
        - policies

(Bynum, 2001a) – *Computer Ethics: Basic Concepts and Historical Overview*

computer ethics…
- is open to narrow interpretation including
    - efforts of professional philosophers to apply
        - traditional ethical theories like
            - utilitarianism
            - Kantianism
            - virtue ethics
                - to issues regarding use of
                    - computer technology
- is open to broad interpretation including
    - standards of professional practice
    - codes of conduct
    - aspects of computer law
    - public policy
    - corporate ethics
    - topics in sociology of computing
    - topics in psychology of computing
- is a branch of
    - applied ethics that
        - studies
        - analyzes
            - social impacts
            - ethical impacts
                - of information technology
- nature is represented by
    - issues
    - problems
    - research
    - scholarship
        - on computers in the workplace
        - on computer crime
        - on privacy
        - on anonymity
        - on intellectual property
        - on professional responsibility
        - on globalization
        - on the metaethics of computer ethics

(Floridi & Sanders, 2002) – *Mapping the Foundational Debate in Computer Ethics*

computer ethics and information ethics…
- stems from
  - practical concerns
  - impact of ICT
- carries out
  - extended study
  - intensive study
    - of individual cases in order to fill
      - policy vacuums
      - conceptual vacuums
- aims to
  - reach decisions based on
    - principles choices
    - defensible ethical criteria
  - provide generalized conclusions in terms of
    - conceptual evaluations
    - moral insights
    - normative guidelines
    - educational programs
    - legal advice
    - industrial standards
    - and so forth
- has moved from
  - problem analysis aimed at sensitizing
    - public opinion
    - professionals
    - politicians
  - to tactical solutions resulting in
    - evolution of professional codes of conduct
    - technical standards
    - usage regulations
    - new legislation
- has combined
  - tactical solutions with
    - strategic analyses
    - global analyses
- is an ethics of *being* hence
  - qualifies as non-standard
- raises
  - information objects to
    - universal patients of
      - any action
- suggests
  - information is elemental
  - entropy is elemental
  - evaluation of
    - beings in terms of
      - contribution to
        - the infosphere
- is infocentric
- is an ontocentric theory

(Marturano, 2002) – *The Role of Metaethics and the Future of Computer Ethics*

computer ethics…

- studies
    - ethical implications of
        - information technologies
        - communication technologies
- is a field of
    - applied ethics
    - professional ethics
- is a branch of
    - applied ethics
- shares
    - theoretical notions with
        - other branches of applied ethics like
            - problems regarding human rights
            - problems regarding future generations
            - problems of intellectual property
    - general ethical problems with
        - other fields of applied ethics

(Bynum & Rogerson, 2003): Bynum – *Computer Ethics and Professional Responsibility*

computer ethics…

- identifies
- analyzes
  - impacts of information technology on
    - social values
    - human values
    - health
    - wealth
    - work
    - opportunity
    - freedom
    - democracy
    - knowledge
    - privacy
    - security
    - self-fulfillment
    - etc
- employs (broad view)
  - fields
  - concepts
  - theories
  - methodologies
    - of applied ethics
    - of sociology of computing
    - of technology assessment
    - of computer law
    - of related fields
- is motivated by
  - the effect of information technology on
    - human values

(Shackelford et al., 2006) – *Computing Curricula 2005: The Overview Report*

Legal/Professional/Ethics/Society…

- an area of
  - practice
  - study
    - within the computing disciplines that
      - helps computing professionals make
        - ethically informed decisions that
          - are within the boundaries of
            - relevant legal systems
            - professional codes of conduct

(De George, 2006) – *Information Technology, Globalization and Ethics*

computer ethics and business ethics…
- is an area of
    - applied ethics
- practitioners have the task of
    - clarifying ethical issues
    - promote intellectually honest discussions
    - develop consensus
    - develop legislation
        - on a global scale

(Górniak-Kocikowska, 2007) – *From Computer Ethics to the Ethics of Global ICT Society*

global ICT ethics, computer ethics, ICT ethics…
- resulted from
    - collaborative work of
        - scholars active globally
- scholars should
    - take on
        - the task of
            - examining the global impact of
                - ICT
            - in terms of
                - possible harm ICT could cause
- should supply
    - arguments supporting decisions in order to
        - prevent use of
            - ICT in harmful ways especially regarding
                - people on peripheries of power centers
                - people who are powerless
                - people who are vulnerable
                - people unable to protect themselves from harm
- has the task to
    - be a watch dog guarding
        - global society from
            - becoming a society of slaves to the few who
                - use ICT
                - use power
                    - to exclusive advantage

(Górniak-Kocikowska, 2007) continues

(Górniak-Kocikowska, 2007) continued

- should be
    - an ethics focusing on
        - the dynamics of relationships between
            - the weak and the strong
            - the rich and the poor
            - the healthy and the sick worldwide
        - exploration of
            - ethical problems from both points of view
- can have
    - a communicative character
- can become
    - an ethics that
        - co-creates
        - is a result of
            - democratic processes

(Stamatellos, 2007) – *Computer Ethics: A Global Perspective*

computer ethics…

- is the systematic study of
    - ethical impact
    - social impact
        - of computers in
            - the information society
        - involves
            - acquisition
            - distribution
            - storage
            - processing
            - dissemination
                - of digital data in
                    - information systems
                - how individuals
                - how groups
                    - interact with
                        - systems
                        - data

(Stamatellos, 2007) continues

(Stamatellos, 2007) continued

- has moral considerations related to
    - responsibility
    - accountability
        - of computer users
        - of computer professionals
            - with regard to
                - design
                - implementation
                    - of information systems
- includes
    - the study of
        - policies
        - rules
        - legislation
            - that refer to
                - situations
                - alternative ethical decisions
                - social implications
- deals with
    - the ethical problems that arise from
        - information technology
            - exaggerating traditional ethical problems
            - converting already known ethical issues into
                - analogous issues
            - creating entirely new ethical problems
    - practical problems
- focuses on
    - nature of moral action
    - responsibility
- has a study prerequisite of being aware of
    - the nature of moral judgment
    - the limitations of ethical decision making in
        - computing

(Barger, 2008) – *Computer Ethics: A Case-based Approach*

computer ethics…
- is an ethics that
    - governs
        - the use of
            - computers
- symbolizes
    - the hope that
        - dilemmas involving
            - the computer can be
                - analyzed with
                    - a systematic use of
                        - normative value theory
- is qualitatively like
    - other kinds of professional ethics like
        - medical ethics
        - legal ethics
- is unique field of study that
    - studies the dilemmas transformed by
        - the computer
        - computer operation

(Van den Hoven, 2008) – *Moral Methodology in Information Technology*

computer ethics…
- is a form of
    - applied ethics
    - practical ethics
- studies
    - moral questions associated with
        - development
        - application
        - use
            - of computers
            - computer science
- exemplifies
    - increasing interest among
        - professionals
        - public policy makers
        - academic philosophers
            - in real-life ethical questions

(Floridi, 2009) – *Network Ethics: Information and Business Ethics in a Networked Society*

computer ethics…
- is applied
- the discipline that
  - deals with
    - ICT-based
      - ethical issues

(Johnson, 2009) – *Computer Ethics, 4th edition*

computer ethics, IT ethics, sociotechnical IT ethics…
- a field that
  - focuses on
    - the role of IT in
      - constituting the moral world
- informs
  - the broader study of
    - technology
    - ethics
- has the task to
  - evaluate the new possibilities
  - fill the policy vacuums
  - address conceptual muddles
- practitioners
  - give attention to
    - the role of IT as
      - an element at play in
        - moral practices
        - moral decisions
        - moral outcomes
- is practical
- is a way of looking at human
  - conditions
  - interactions
  - arrangements
  - choices
  - actions
    - using concepts
    - using theories
      - that are normative

(Johnson, 2009) continues

(Johnson, 2009) continued

- has the goal to
  - provide analysis that
    - informs decisions
    - informs actions
- plays a role in
  - identifying ethical issues in
    - design processes
    - design features
    - the lifecycle of
      - IT which contributes to the configuration of
        - social arrangements
        - social practices
        - social institutions
- is intertwined with
  - other dimensions of life like
    - legal
    - economic
    - religious
    - political

(Sicart, 2009) – *The Ethics of Computer Games*

computer ethics…

- is the field that
  - studies
    - the ethical implications that
      - the use of
        - Internet communication technologies
        - computational technologies
          - create
  - determines if
    - the ethical issues are
      - new problems
      - reiterations of old problems

(Floridi, 2010) – *The Cambridge Handbook of Information and Computer Ethics*

information and computer ethics…

- a new branch of
    - applied ethics that
        - investigates
            - transformations brought about by ICTs
            - ICTs implications for
                - the future of human life
                - society
                - the evolution of moral values
                - the evolution of rights
                - the evaluation of agents' behaviors
- subject matter includes
    - PAPA (privacy, accuracy, intellectual property and access)
    - 'the triple A' (availability, accessibility and accuracy of information)
    - ownership and piracy
    - the digital divide
    - infoglut and research ethics
    - complex systems'
        - safety
        - reliability
        - trustworthiness
    - digital vandalism including
        - viruses
        - hacking
        - other forms
    - freedom of expression and censorship
    - pornography
    - monitoring and surveillance
    - security and secrecy
    - propaganda
    - identity theft
    - the construction of the self
    - panmnemonic issues and personal identity
    - new forms of agency (artificial and hybrid), of responsibility and accountability
    - roboethics and the moral status of artificial agents
    - e-conflicts
    - the re-prioritization of values and virtues

(Luppicini, 2010) – *Technoethics and the Evolving Knowledge Society: Ethical Issues in Technological Design, Research, Development, and Innovation*

computer and engineering technoethics, information and communication technoethics…
- a branch of
    - technoethics
- is concerned with
    - the ethical aspects of
        - computer technology
        - engineering
            - in contemporary life
            - in society
        - information technology
        - communication technology
- topic areas include
    - computer environmental technoethics
    - military technoethics
    - nanoethics
    - nuclear ethics
    - cyberethics
    - cyber-pornography
    - cybercrime
    - cyber-stalking
    - internet ethics
    - media ethics
    - netiquette
    - etc.
- draws on work in
    - computer ethics
    - concern with human use of
        - computer technology in
            - computing in the workplace
            - graphic interfaces
            - visual technology
            - artificial intelligence
            - robotics
    - engineering ethics
    - public concern over
        - large scale research
        - large scale innovation
        - military operations
        - nanotechnology research
        - conduct of engineers
        - engineers' moral responsibilities to
            - the public
- characteristics include
    - communication processes
    - ethical issues connected to
        - mass media
        - communication technology

(O'Brien & Marakas, 2010) – *Introduction to Information Systems*

Business/IT security, Ethics, Society; Technology ethics…

- deals with
    - ethical issues in the areas of
        - crime
        - privacy
        - individuality
        - employment
        - health
        - working conditions
    - use of
        - any form of technology
- has principles that include
    - proportionality (good outweighs harm)
    - informed consent
    - justice (fair distribution)
    - minimized risk

(Bynum, 2011) – *Computer and Information Ethics*

computer and information ethics…

- is a branch of
    - applied ethics that broadly
        - studies
        - analyzes
            - social impact
            - ethical impact
                - of ICT
- is a term that
    - refers to
        - applications by professional philosophers
            - of traditional Western theories like
                - utilitarianism
                - Kantianism
                - virtue ethics
            - to ethical cases that involve
                - computers
                - computer networks
        - a kind of professional ethics in which
            - computer professionals apply
                - codes of ethics
                - standards of good practice
                    - within the profession
        - aspects of computer ethics associated with
                - the Internet
- nature is represented by
    - issues
    - problems
    - research
    - scholarship
        - on computers in the workplace
        - on computer crime
        - on privacy
        - on anonymity
        - on intellectual property
        - on professional responsibility
        - on globalization
        - on the metaethics of computer ethics

(Baase, 2012) – *A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology*

computer ethics, professional ethics…

- scope of the term
    - varies considerably
    - can include
        - social issues
        - political issues
        - impact of computers on
            - employment
            - environment
        - whether or not to sell computers to
            - totalitarian governments
        - use of computer systems by
            - the military
        - impact of new applications on
            - privacy
        - personal dilemmas about
            - what to post on the Internet
            - what to download
- considers
    - ethical issues encountered by
        - computer professionals
- includes
    - relationships with
    - responsibilities toward
        - customers
        - clients
        - coworkers
        - employees
        - employers
        - users
        - affected individuals
- examines
    - ethical dilemmas
    - guidelines
    - situations
        - related to
            - actions
            - decisions
                - of individuals who
                    - create
                    - use
                        - computer systems

(Tavani, 2012) – *Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing*

cyberethics…
- is a branch of
    - applied ethics
- is the study of
    - moral
    - legal
    - social
        - issues involving
            - cybertechnology like
                - computing devices
                - communication devices
                - stand-alone computers
                - connected/networked technologies
- examines
    - the impact of
        - cybertechnology on
            - social
            - legal
            - moral
                - systems
- evaluates
    - social policies
    - laws
        - that have been framed in response to
            - issues generated by
                - development
                - use
                    - of cybertechnology

(Valacich & Schneider, 2013) – *Information Systems Today: Managing in the Digital World*

computer ethics…

- is used to describe
    - moral issues
    - standards of conduct
        - as they pertain to the use of
            - information systems
- has a central debate on
    - information
        - privacy
        - accuracy
        - property
        - accessibility
    - email privacy
    - Internet (online privacy)
    - notice/awareness
    - choice/consent
    - access/participation
    - integrity/security
    - enforcement/redress
    - intellectual property
    - the human cost
    - code of ethical conduct
    - responsible computer use
    - the digital divide

- is a broad range of
    - issues
    - standards of conduct
        - that have emerged through
            - use
            - proliferations of
                - information systems

APPENDIX C: DEFINITION TAXONOMY

Top Level

Attributes:
- is
- has
- presents itself as
- refers to
- symbolizes
- exemplifies
- shares (features with)
- characteristics include
- deals with
- domain is
- standards are
- (subject matter/topic areas) includes
- challenge is

Foundation:
- stems from
- surfaced from
- resulted from
- draws on
- based on
- requires

Method:
- studies
- examines
- describes
- evaluates
- identifies
- analyzes/analysis (of)
- develops
- formulation
- justification

Actions:
- employs
- adopted
- aims to
- attempts to
- sets forth
- raises
- suggests
- endorses
- informs
- fills
- plays a role in
- carries out
- considers
- takes into account

Recommendations:
- should supply
- should use
- should be
- can have
- can become

Complete Taxonomy

Attributes:

- is
  - applied
  - practical
  - infocentric
  - an ontocentric theory
  - intrinsically decision-making oriented
  - open to narrow interpretation including
    - efforts of professional philosophers to apply
      - traditional ethical theories like
        - {utilitarianism
        - Kantianism
        - virtue ethics
          - to issues regarding use of
            - computer technology}
  - open to broad interpretation including
    - standards of professional practice
    - codes of conduct
    - aspects of computer law
    - public policy
    - corporate ethics
    - topics in sociology of computing
    - topics in psychology of computing
  - a term that
    - has acquired a broad sense
    - has a considerably varied scope
    - refers to
      - applications by professional philosophers
        - of traditional Western theories like
          - utilitarianism
          - Kantianism
          - virtue ethics
        - to ethical cases that involve
          - computers
          - computer networks
      - a kind of professional ethics in which
        - computer professionals apply
          - codes of ethics
          - standards of good practice
            - within the profession
      - aspects of computer ethics associated with
          - the Internet
    - can include
      - social issues

- political issues
- impact of computers on
    - employment
    - environment
- whether or not to sell computers to
    - totalitarian governments
- use of computer systems by
    - the military
- impact of new applications on
    - privacy
- personal dilemmas about
    - what to post on the Internet
    - what to download

- used to describe
    - {moral issues
    - standards of conduct
        - as they pertain to the use of
            - information systems}
- a broad range of
    - {issues
    - standards of conduct
        - that have emerged through
            - {use
            - proliferations of
                - information systems}}
- a branch of
    - applied ethics (with an aim to; that)
        - arrive at well-supported moral analysis
        - use analyses
        - affect discourse
        - affect policies
        - affect practices
        - {studies
        - analyzes
            - social impacts
            - ethical impacts
                - of information technology
                - of ICT}
        - investigates
            - transformations brought about by ICTs
            - ICTs implications for
                - the future of human life
                - society
                - the evolution of moral values
                - the evolution of rights
                - the evaluation of agents' behaviors

  - technoethics
- an area of
  - applied ethics
  - {practice
  - study
    - within the computing disciplines that
      - helps computing professionals make
        - ethically informed decisions that
          - are within the boundaries of
            - relevant legal systems
            - professional codes of conduct}
- a form of
  - applied ethics
  - practical ethics
- the discipline that
  - deals with
    - ICT-based
      - ethical issues
- a field that/of
  - applied ethics
  - professional ethics
  - substantial practical importance
  - includes
    - applied ethics
    - sociology of computing
    - technology assessment
    - computer law
    - related fields
  - focuses on
    - the role of IT in
      - constituting the moral world
  - examines
    - ethical problems that are
      - {aggravated
      - transformed
      - created
        - by computer technology}
  - study which is
    - dynamic
    - complex
    - considers relationships among
      - {facts
      - conceptualizations
      - policies
      - values
        - with regard to changing technology}

- studies
    - the ethical implications that
        - {the use of
            - Internet communication technologies
            - computational technologies
                - create}
    - the dilemmas transformed by
        - the computer
        - computer operation
- determines if
    - the ethical issues are
        - new problems
        - reiterations of old problems

- an ethics that/of
    - *being* hence
        - qualifies as non-standard
    - governs
        - the use of
            - computers
- a way of looking at
    - conditions
    - interactions
    - arrangements
    - choices
    - actions
        - {using concepts
        - using theories
            - that are normative}
- the (systematic) study of
    - {moral
    - legal
    - social
        - issues involving
            - cybertechnology like
                - computing devices
                - communication devices
                - stand-alone computers
                - connected/networked technologies}
    - {{ethical impact
    - social impact
        - of computers in
            - the information society}
        - involves
            - acquisition
            - distribution
            - storage

      - processing
      - dissemination
        - of digital data in
          - information systems
        - how individuals
        - how groups
          - interact with
            - systems
            - data}
  - {policies
  - rules
  - legislation
    - that refer to
      - situations
      - alternative ethical decisions
      - social implications}
- motivated by
  - the effect of
    - information technology on
      - human values
- concerned with
  - the ethical aspects of
    - computer technology
    - engineering
      - in contemporary life
      - in society
    - information technology
    - communication technology
- (nature) represented by
  - {issues
  - problems
  - research
  - scholarship
    - on computers in the workplace
    - on computer crime
    - on privacy
    - on anonymity
    - on intellectual property
    - on professional responsibility
    - on globalization
    - on the metaethics of computer ethics}
- values that
  - guide activities of
    - computing professionals in
      - {design
      - development

        - of computer artifacts like
          - program documentation
          - test plans
          - test cases
          - feasibility studies
          - source code
          - user manuals
          - system maintenance manuals
          - design documents
          - all products of the system development process}
- intertwined with
  - other dimensions of life like
    - legal
    - economic
    - religious
    - political
- qualitatively like
  - other kinds of professional ethics like
    - medical ethics
    - legal ethics
- logically argumentative with
  - bias for analogical reasoning
- empirically grounded with
  - bias for scenario analysis
- applied using
  - traditional ethical theories used by
    - philosophers doing applied ethics like
      - utilitarian ethics (Bentham and Mill)
      - rationalist ethics (Kant)
- {ethical values
- rules
- judgments
  - applied in
    - a computing context based on
      - professional standards
      - concern for the user of
        - the computing artifact}
- a computer professional stating they have
  - the skill
  - the talent
  - the experience
    - to do a job well
  - the moral commitment to
    - a set of moral values
  - a derivative commitment to
    - a set of standards about

        - software development
    - a commitment to the user

- has
  - a study prerequisite of
    - the nature of moral judgment
    - the limitations of ethical decision making in
      - computing
  - a central aim to
    - formulate policies
    - guide individual action
    - guide collective action
  - a central debate on
    - information
      - privacy
      - accuracy
      - property
      - accessibility
    - email privacy
    - Internet (online privacy)
    - notice/awareness
    - choice/consent
    - access/participation
    - integrity/security
    - enforcement/redress
    - intellectual property
    - the human cost
    - code of ethical conduct
    - responsible computer use
    - the digital divide
  - the central task of
    - formulating policies to
      - guide our actions when
        - {policies do not exist
        - policies are inadequate
          - for conduct in situations created by
            - {new capabilities
            - new choices for action
              - due to computers}}
    - proposing conceptual frameworks for
      - understanding ethical problems involving
        - computer technology
  - moved from
    - problem analysis aimed at sensitizing
      - public opinion
      - professionals

- politicians
- to tactical solutions resulting in
  - evolution of professional codes of conduct
  - technical standards
  - usage regulations
  - new legislation
- a focus (broad & narrow) on
  - individual professional responsibility in
    - the practice of the craft
  - narrow
    - writing code
    - producing documentation
  - nature of moral action
  - responsibility
- a scope of
  - {individual practice that essentially involves computers
  - collective practice that essentially involves computers
    - use
    - development
    - regulation
    - management
    - advocacy
    - advertisement
      - of computer technology}
  - products of practice
    - computer systems
    - computer software
    - manuals
    - advertisements
    - laws
    - policies
- goals of/to
  - making rational decisions
  - solving technical problems
  - solving educational problems
  - solving ethical problems
  - adopting legislation
  - provide analysis that
    - informs decisions
    - informs actions
- the task of/to
  - be a watch dog guarding
    - global society from
      - becoming a society of slaves to the few who
        - {use ICT
        - use power

                    - to exclusive advantage}
        - evaluate the new possibilities
        - fill the policy vacuums
        - address conceptual muddles
- principles that include
    - proportionality (good outweighs harm)
    - informed consent
    - justice (fair distribution)
    - minimized risk
- moral considerations related to
    - {responsibility
    - accountability
        - of computer users
        - of computer professionals}
            - with regard to
                - design
                - implementation
                    - of information systems
- combined
    - tactical solutions with
        - strategic analyses
        - global analyses
- a direct relationship with
    - ethical decisions made during
        - development of
            - computing artifacts
- practitioners/scholars
    - including
        - philosophers
        - computer scientists
        - social scientists
        - public policy makers
        - or whatever
    - have the goal to
        - integrate technology and human values
        - advance technology
        - protect human values
        - not damage human values
    - have the task of
        - {clarifying ethical issues
        - promote intellectually honest discussions
        - develop consensus
        - develop legislation
            - on a global scale}
    - should take on
        - the task of

                - examining
                    - the global impact of
                        - ICT
                    - in terms of
                        - possible harm ICT could cause
        - give attention to
            - the role of IT as
                - an element at play in
                    - moral practices
                    - moral decisions
                    - moral outcomes

- presents itself as
    - infocentric ethics
    - object-oriented ethics
    - an ontocentric object-oriented theory
- refers to
    - a set of
        - {rules
        - principles
            - used for moral decision making regarding
                - computer technology
                - computer use}
- symbolizes
    - the hope that
        - dilemmas involving
            - the computer can be
                - analyzed with
                    - a systematic use of
                        - normative value theory
- exemplifies
    - increasing interest among
        - {professionals
        - public policy makers
        - academic philosophers
            - in real-life ethical questions}

- shares (features with)
    - philosophical disciplines
    - theoretical notions with
        - other branches of applied ethics like
            - problems regarding human rights
            - problems regarding future generations
            - problems of intellectual property
    - general ethical problems with
        - other fields of applied ethics

- characteristics include
    - communication processes
    - ethical issues connected to
        - mass media
        - communication technology
- deals with
    - ethical issues in the areas of
        - crime
        - privacy
        - individuality
        - employment
        - health
        - working conditions
    - ethical problems that arise from
        - information technology
            - exaggerating traditional ethical problems
            - converting already known ethical issues into
                - analogous issues
            - creating entirely new ethical problems
    - use of
        - any form of technology
    - practical problems
- domain is
    - standards for developing computing artifacts which
        - are tempered by professional values
- standards are
    - developing as
        - the standards of the craft are developed
- (subject matter/topic areas) includes
    - computers
    - associated technology
    - software
    - hardware
    - networks
    - {relationships with
    - responsibilities toward
        - customers
        - clients
        - coworkers
        - employees
        - employers
        - users
        - affected individuals}
    - PAPA (privacy, accuracy, intellectual property and access)
    - ‘the triple A’ (availability, accessibility and accuracy of information)
    - ownership and piracy

- the digital divide
- infoglut and research ethics
- complex systems'
    - safety
    - reliability
    - trustworthiness
- digital vandalism including
    - viruses
    - hacking
    - other forms
- freedom of expression and censorship
- pornography/cyber-pornography
- monitoring and surveillance
- security and secrecy
- propaganda
- identity theft
- the construction of the self
- panmnemonic issues and personal identity
- new forms of agency (artificial and hybrid), of responsibility and accountability
- roboethics and the moral status of artificial agents
- e-conflicts
- the re-prioritization of values and virtues
- computer environmental technoethics
- military technoethics
- nanoethics
- nuclear ethics
- cyberethics
- cybercrime
- cyber-stalking
- internet ethics
- media ethics
- netiquette
- etc.

- challenge is
    - to formulate policies which
        - help us deal with dilemmas

Foundation:

- stems from
    - practical concerns
    - impact of
        - ICT
- surfaced from
    - practical concerns in
        - information society
- resulted from

- collaborative work of
    - scholars active globally
- draws on
    - concern with human use of
        - computer technology in
            - computing in the workplace
            - graphic interfaces
            - visual technology
            - artificial intelligence
            - robotics
    - engineering ethics
    - public concern over
        - large scale research
        - large scale innovation
        - military operations
        - nanotechnology research
        - conduct of engineers
        - engineers' moral responsibilities to
            - the public
- based on
    - case studies
- requires
    - new thinking about
        - the nature of
            - computer technology
        - our values

Method:
- studies
    - the way in which computers
        - pose new versions of standard moral problems
        - pose moral dilemmas
        - exacerbate the old problems
        - force us to apply ordinary moral norms in
            - uncharted realms
    - ethical implications of
        - information technologies
        - communication technologies
    - moral questions associated with
        - {development
        - application
        - use
            - of computers
            - computer science}
- examines
    - impact of

- computing and information technology on
    - human values using
        - {concepts
        - theories
        - procedures
            - from philosophy
            - from sociology
            - from law
            - from psychology
            - and so on}
- cybertechnology on
        - social systems
        - legal systems
        - moral system
- {ethical dilemmas
- guidelines
- situations
    - related to
        - actions
        - decisions
            - of individuals who
                - create
                - use
                    - computer systems}
- describes
    - the relation of values to
        - professional work
- evaluates
    - {social policies
    - laws
        - that have been framed in response to
            - issues generated by
                - development
                - use
                    - of cybertechnology}
- {identifies
- analyzes/analysis (of)
    - impacts of information technology on
        - social values
        - human values
        - health
        - wealth
        - work
        - opportunity
        - freedom
        - democracy

    - knowledge
    - privacy
    - security
    - self-fulfillment
    - etc}
  - {the nature
  - social impact
    - of computer technology}
- develops
  - analyses
- {formulation
- justification
  - of policies for
    - the ethical use of
      - computer technology} which includes
        - computers
        - associated technology
        - software
        - hardware
        - networks

Actions:

- employs
  - {fields
  - concepts
  - theories
  - methodologies
    - of applied ethics
    - of sociology of computing
    - of technology assessment
    - of computer law
    - of related fields}
- adopted
  - a bottom-up procedure
- aims to
  - reach decisions based on
    - principled choices
    - defensible ethical criteria
    - defensible ethical principles
  - provide generalized conclusions in terms of
    - conceptual evaluations
    - moral insights
    - normative guidelines
    - educational programs
    - legal advice
    - industrial standards
    - and so forth

- attempts to
    - indicate the best course of action as a consequence of
        - {steady attention
        - careful attention
            - to what happens in
                - the information environment}
- sets forth
    - criteria for
        - making ethical decisions during
            - the process (of development)
- raises
    - information objects to
        - universal patients of
            - any action
    - information to the role of
        - {the true patient
        - the universal patient of
            - any action}
- suggests
    - information is elemental
    - entropy is elemental
    - evaluation of
        - beings in terms of
            - contribution to
                - the infosphere
- endorses
    - a problem solving approach
- informs
    - the broader study of
        - technology
        - ethics
- fills
    - policy vacuums
- plays a role in
    - identifying ethical issues in
        - design processes
        - design features
        - the lifecycle of
            - IT which contributes to the configuration of
                - social arrangements
                - social practices
                - social institutions
- carries out
    - {extended study
    - intensive study
    - extended analysis

- intensive analysis
    - of individual cases in order to fill
        - policy vacuums
        - conceptual vacuums}
- considers
    - ethical issues encountered by
        - computer professionals
- takes into account
    - relations between/among
        - practicing professionals and their clients
        - the profession and society in general
        - professionals
        - employee and employer
    - specialized technical details of the profession

Recommendations:
- should supply
    - arguments supporting decisions in order to
        - prevent use of
            - ICT in harmful ways especially regarding
                - people on peripheries of power centers
                - people who are powerless
                - people who are vulnerable
                - people unable to protect themselves from harm
- should use
    - {procedures
    - concepts
        - of utilitarianism
        - of Kantianism}
- should be
    - an ethics focusing on
        - the dynamics of relationships between
            - the weak and the strong
            - the rich and the poor
            - the healthy and the sick worldwide
        - exploration of
            - ethical problems from both points of view
    - organized around
        - the standards of software development
- can have
    - a communicative character
- can become
    - an ethics that
        - {co-creates
        - is a result of
            - democratic processes}

APPENDIX D: DEFINITION CODEBOOK

Code (*Definition*)	**Application Count**
(computer) hardware	2
(computer) networks	4
(computer) software	3
(nature) represented by	1
ICT	7
Internet	3
Internet ethics	1
Kantianism (rationalist)	4
a term that	1
a way of looking at	1
access/participation	2
accountability	2
actions/conduct	6
activities	1
adopted	1
adopting legislation	1
advance technology	1
advertisement (action)	1
advertisements	1
advocacy	1
affect discourse	1
affect policies	1
affect practices	1
affected individuals	1
aims to	1
all products of system development	1
analogical reasoning	1
analogous issues	1
analyses	1
analysis (extended)	1
analysis (intensive)	1
analyze/analyzes	3
anonymity	1
application (action)	1
applications (software)	1
applied (as in used)	2
applied (ethics)	10
area of	1

Code (*Definition*)	**Application Count**
arguments	1
arrangements	1
artificial agents	1
artificial intelligence	1
attempts to	1
attention	1
based on	1
beings	1
bottom-up procedure	1
branch of	1
broad	4
can become	1
can have	1
carries out	1
case studies	1
cases	1
central aim to	1
central debate on	1
central task of	1
challenge is	1
changing technology	1
characteristics include	1
choice/consent	1
choices	1
choices (principled)	1
clients	2
code(s) of ethics	1
codes of conduct	3
collaborative work	1
collective (the)	2
collective practice	1
combined (action)	1
commitment to the user	1
communication devices	1
communication processes	1
communication technology	4
communicative character	1
complex	1
complex systems	1
computational technology	1

Code (*Definition*)	**Application Count**
computer artifacts	1
computer crime	1
computer environmental technoethics	1
computer operation	1
computer science	1
computer scientists	1
computer systems	3
computer technology	9
computer users	1
computer(s)	15
computers(ing) in the workplace	2
computing and information technology	1
computing artifact(s)	3
computing context	2
computing devices	1
computing discipline	1
computing professionals	6
computing/computer law	3
concepts	3
conceptual evaluations	1
conceptual muddles (address)	1
conceptual vacuums (fill)	1
conceptualizations	1
concern (public)	1
concern for the user	1
concern(s)	1
concerned with	1
concerns (practical)	2
conditions	1
considers	1
construction of the self	1
contribution (benefit)	1
corporate ethics	1
coworkers	1
crime	1
criteria	1
customers	1
cyber-stalking	1
cybercrime	1
cyberethics	1

Code (*Definition*)	**Application Count**
cybertechnology	3
data acquisition	1
data dissemination	1
data distribution	1
data interactions	1
data processing	1
data storage	1
deals with	2
decision-making (ethically informed)	5
decision-making (moral)	2
decision-making/decisions	4
defensible ethical criteria	1
defensible ethical principles	1
democracy (co-creates)	1
democracy (result of)	1
derivative commitment	1
describes	2
design	2
design documents	1
design features	1
design processes	1
determines	1
develop consensus	1
develop legislation	1
development/create	8
develops	1
digital divide	2
digital vandalism (viruses, hacking, other forms)	1
dilemmas	2
discipline that	1
domain is	1
draws on	1
dynamic	1
e-conflicts	1
economic dimensions (life)	1
educational programs	1
element at play	1
email privacy	1
empirically grounded	1

Code (*Definition*)	**Application Count**
employees	2
employers	2
employment	1
employs	1
endorses	1
enforcement/redress	1
engineering	1
engineering ethics	1
engineers	2
entropy is elemental	1
etc; whatever; and so on	5
ethical aspects	1
ethical cases	1
ethical dilemmas	1
ethical issues (clarify)	1
ethical problems	3
ethical problems (aggravated/exaggerated)	2
ethical problems (created/new)	4
ethical problems (solving)	1
ethical problems (transformed/convert)	3
ethical problems (understanding)	1
ethical questions (real-life)	1
ethics (general)	2
ethics of BEING	1
evaluates	1
evaluation	1
examines	2
examining	1
exclusive advantage	1
exemplifies	1
experience (job)	1
explore	1
expression/censorship	1
facts	1
feasibility studies	1
field that/of	1
fields/disciplines	1
focuses on	3
form of	1

Code (*Definition*)	**Application Count**
formulate policies	4
give attention to	1
global analyses	1
global scale	1
global society	1
globalization	1
globally	2
goals of/to	2
governs	1
graphic interfaces	1
groups	1
guard	1
guide collective action	2
guide individual action	2
guidelines	1
hacking	1
harmful ways	1
has	1
health	1
hope	1
human cost	1
identifies	2
identity theft	1
impact (ethical)	4
impact (general)	1
impact (global)	1
impact (legal)	1
impact (moral)	3
impact (rights)	1
impact (social)	7
impact on behavior evaluation	1
impact on codes of conduct	1
impact on contemporary life	1
impact on democracy	1
impact on employment/work	2
impact on environment	1
impact on freedom	1
impact on health	1
impact on human life	1
impact on human values	4

Code (*Definition*)	**Application Count**
impact on knowledge	1
impact on opportunity	1
impact on privacy	2
impact on security	1
impact on self-fulfillment	1
impact on social arrangements	1
impact on social institutions	1
impact on social practices	1
impact on social values	1
impact on wealth	1
implementation	1
includes	2
indicate course of action	1
individual practice	1
individual(s)	3
individuality	1
infocentric	2
infoglut/research ethics	1
information	1
information accessibility	2
information accuracy	3
information availability	1
information environment	1
information is elemental	1
information objects	1
information privacy	1
information property	1
information society	2
information systems	4
information technology	9
informed consent	1
informs actions	1
informs decisions	2
informs study	1
infosphere	1
innovation (large scale)	1
integrate technology and human values	1
integrity/security	1
intellectual property	3

Code (*Definition*)	**Application Count**
interactions	1
interest	1
intertwined with	1
investigate(s)	1
is	1
issues (ethical)	5
issues (general)	2
issues (legal)	1
issues (moral)	2
issues (political)	1
issues (social)	2
judgments (ethical)	1
justice	1
justification (policies)	1
law (discipline)	1
laws	2
legal advice	1
legal boundaries	1
legal dimensions (life)	1
legislation	2
lifecycle (development process)	1
logically argumentative	1
management	1
manuals	1
mass media	1
media ethics	1
metaethics (of computer ethics)	1
methodologies	1
military technoethics	1
minimized risk	1
monitoring/surveillance	1
moral analysis	1
moral commitment	1
moral considerations	1
moral dilemmas	1
moral insight	1
moral norms	1
moral outcomes	1
moral practices	1
moral problems (exacerbated)	1

Code (*Definition*)	**Application Count**
moral problems (new versions)	1
moral questions	1
motivated by	1
moved from	1
nanoethics	1
narrow	2
nature of computer technology	2
nature of moral action	1
nature of moral judgment	1
netiquette	1
new capabilities	1
new choices (for action)	2
new possibilities (evaluate)	1
new thinking	1
non-standard	1
normative concepts	1
normative guidelines	1
normative theories	1
normative value theory	1
not damage human values	1
notice/awareness	1
nuclear ethics	1
object-oriented	1
online (Internet) privacy	1
ontocentric theory	2
organized around	1
ownership/piracy	1
panmnemonic issues/personal identity	1
people (healthy)	1
people (peripheral of power centers)	1
people (poor)	1
people (powerless)	1
people (rich)	1
people (sick)	1
people (strong)	1
people (unprotected)	1
people (vulnerable)	1
people (weak)	1
personal dilemmas	2
philosophers	5

Code (*Definition*)	**Application Count**
philosophical disciplines	1
philosophy (discipline)	1
plays a role	1
policies	4
policies (social)	1
policy vacuums (fill)	4
political dimensions (life)	1
pornography	1
possible harm	1
power	1
practical (ethics)	3
practice(s) (professional)	3
practitioners	1
presents itself as	1
prevent (mis)use	1
principles	2
privacy	3
problem analysis	1
problem solving approach	1
problems (future generations)	1
problems (general)	1
problems (human rights)	1
problems (intellectual property)	1
problems (practical)	1
procedures	2
producing documentation	1
products of practice	1
profession	2
professional ethics	3
professionals	3
program documentation	1
proliferation	1
promote discussions	1
propaganda	1
proportionality	1
proposing conceptual frameworks	1
protect human values	1
provide analysis	1
provide conclusions	1
psychology (discipline)	1

Code (*Definition*)	**Application Count**
psychology of computing	1
public (the)	1
public policy	1
public policy makers	2
qualitative	1
raises	1
refers to	2
regulation	1
related fields/other branches	4
relationship with	1
relationships	5
reliability	1
religious dimensions (life)	1
requires	1
research (general)	1
research (large scale)	1
research (nanotechnology)	1
responsibility (moral)	1
responsibility (professional)	2
responsibility(ies)	4
resulted from	1
roboethics/moral status of artificial agents	1
robotics	1
rules	2
rules (ethical)	1
safety	1
scenario analysis	1
scholars	2
scholarship (general)	1
scope of	1
security/secrecy	1
selling to totalitarian government	1
sensitizing politicians	1
sensitizing professionals	1
sensitizing public opinion	1
sets forth	1
shares (features with)	1
should be	1
should supply	1

Code (*Definition*)	**Application Count**
should use	1
situations	2
skill (job)	1
slaves	1
social scientists	1
society	1
sociology (discipline)	1
sociology of computing	3
software development	1
solving educational problems	1
solving technical problems	1
source code	1
standards (industrial)	1
standards (professional)	4
standards (software development)	1
standards (technical)	3
standards of conduct	2
standards of practice	2
stems from	1
strategic analyses	1
study (extended)	1
study (intensive)	1
study prerequisite	1
study/studies (systematic)	6
subject matter/topic areas include	1
suggests	1
surfaced from	1
symbolizes	1
system maintenance manuals	1
systematic use	1
systems interaction	1
tactical solutions	2
take on	1
takes into account	1
talent (job)	1
task of/to	3
technoethics	1
technology	4
technology assessment	2
test cases	1

Code (*Definition*)	**Application Count**
test plans	1
theoretical notions	1
theories	2
traditional ethical theories	3
transformations	2
true patient	1
trustworthiness	1
uncharted realms	1
universal patient	2
usage regulations	1
use	14
use (ethical)	1
use (military)	2
use analyses	1
user manuals	1
users	1
utilitarianism	4
values	4
values (ethical)	1
values (moral)	1
values (professional)	1
virtue ethics	2
viruses	1
visual technology	1
working conditions	1
writing code	1

APPENDIX E: PATTERN SCHEME

Meta Pattern

(nature) represented by
a term that
a way of looking at
adopted
aims to
applied (as in used)
area of
attempts to
based on
branch of
can become
can have
carries out
central aim to
central debate on
central task of
challenge is
characteristics include
combined (action)
concerned with
considers
deals with
discipline that
domain is
draws on
employs
endorses
exemplifies
field that/of
focuses on
form of
goals of/to
governs

guard
has
includes
indicate course of action
informs study
intertwined with
is
motivated by
moved from
organized around
plays a role
presents itself as
raises
refers to
relationship with
requires
resulted from
scope of
sets forth
shares (features with)
should be
should supply
should use
stems from
study prerequisite
subject matter/topic areas include
suggests
surfaced from
symbolizes
take on
takes into account
task of/to

Characteristics Pattern

broad
communicative character
complex
dynamic
empirically grounded
ethics (general)
ethics of *being*
global scale
hope
infocentric
logically argumentative
narrow
non-standard
object-oriented
ontocentric theory
practical (ethics)
qualitative

Who Pattern

affected individuals
clients
collective (the)
computer scientists
computer users
computing professionals
coworkers
customers
employees
employers
engineers
global society
groups
individual(s)
people (healthy)
people (peripheral of power centers)
people (poor)
people (powerless)

people (rich)
people (sick)
people (strong)
people (unprotected)
people (vulnerable)
people (weak)
philosophers
practitioners
profession (as in those of the profession)
professionals
public (the)
public policy makers
scholars
slaves (to the few)
social scientists
society
users

What Pattern

(computer) hardware
(computer) networks
(computer) software
ICT
Internet
advertisements
all products of system development
applications (software)
artificial intelligence
artificial agents
changing technology
communication devices
communication technology
complex systems
computational technology
computer artifacts
computer operation
computer science
computer systems
computer technology
computer(s)
computing and information technology
computing artifact(s)
computing devices
cybertechnology

design documents
engineering
feasibility studies
graphic interfaces
information
information objects
information systems
information technology
laws
manuals
mass media
policies
products of practice
program documentation
robotics
source code
system maintenance manuals
technology
test cases
test plans
true patient
universal patient
power
user manuals
visual technology

Where Pattern

actions/conduct
activities
advertisement (action)
advocacy
analogous issues
arrangements
beings
choices
communication processes
computer crime
computers(ing) in the workplace
computing context
computing discipline
conditions
construction of the self
crime
cyber-stalking
cybercrime
data acquisition
data dissemination
data distribution
data interactions
data processing
data storage
decision-making (ethically informed)
decision-making (moral)
decision-making/decisions
design
design features
design processes
development/create
digital vandalism
dilemmas
e-conflicts
email privacy
ethical aspects
ethical cases
ethical dilemmas
ethical problems

ethical problems (aggravated/exaggerated)
ethical problems (created/new)
ethical problems (transformed/convert)
ethical questions (real-life)
facts
globalization
guidelines
hacking
harmful ways
health
identity theft
impact (ethical)
impact (global)
impact (legal)
impact (moral)
impact (rights)
impact (social)
impact on behavior evaluation
impact on contemporary life
impact on democracy
impact on employment/work
impact on environment
impact on freedom
impact on health
impact on human life
impact on human values
impact on knowledge
impact on opportunity
impact on privacy
impact on security
impact on self-fulfillment
impact on social values
impact on wealth
implementation
individuality
infoglut/research ethics
innovation (large scale)
interactions
issues (ethical)

issues (general)
issues (legal)
issues (moral)
issues (political)
issues (social)
laws
legislation
lifecycle (development process)
management
moral dilemmas
moral outcomes
moral practices
moral problems (exacerbated)
moral problems (new versions)
moral questions
nature of computer technology
nature of moral action
new capabilities
new choices (for action)
personal dilemmas
policies
policies (social)
pornography
problems (future generations)
problems (human rights)
problems (intellectual property)
problems (practical)

producing documentation
proliferation
propaganda
regulation
relationships
research (large scale)
research (nanotechnology)
responsibility (moral)
responsibility (professional)
responsibility(ies)
roboethics/moral status of artificial agents
rules
selling to totalitarian government
situations
software development
standards of conduct
systems interaction
transformations
uncharted realms
usage regulations
use
use (ethical)
use (military)
viruses
working conditions
writing code

Why Pattern

access/participation
accountability
adopting legislation
advance technology
affect discourse
affect policies
affect practices
anonymity
choice/consent
commitment to the user
conceptual muddles (address)
conceptual vacuums (fill)
concern (public)
concern for the user
concern(s)
concerns (practical)
contribution (benefit)
democracy (result of)
derivative commitment
develop consensus
develop legislation
digital divide
element at play (because IT is an element in play)
employment
enforcement/redress
ethics (general) (because it informs ethics)
evaluation
exclusive advantage
expression/censorship
formulate policies
guide collective action
guide individual action
human cost
impact (general)
impact on codes of conduct
impact on social arrangements
impact on social institutions
impact on social practices
information accessibility
information accuracy

information availability
information environment
information privacy
information property
information society
informed consent
informs actions
informs decisions
infosphere
integrity/security
intellectual property
justice
legislation
metaethics (of computer ethics)
minimized risk
monitoring/surveillance
moral commitment
not damage human values
notice/awareness
online (Internet) privacy
ownership/piracy
panmnemonic issues/personal identity
policies
policy vacuums (fill)
prevent (mis)use
privacy
promote discussions
proportionality
protect human values
reliability
safety
security/secrecy
sensitizing politicians
sensitizing professionals
sensitizing public opinion
solving educational problems
solving technical problems
standards (technical)
trustworthiness

How Pattern

analogical reasoning
analyses
analysis (extended)
analysis (intensive)
analyze/analyzes - Meta
application (action)
applied (as in used)
arguments
attention
bottom-up procedure
case studies
cases
collaborative work
concepts
criteria
democracy (co-creates)
describes - Meta
determines
develops - Meta
ethical issues (clarify)
ethical problems (solving)
ethical problems (understanding)
evaluates - Meta
examines - Meta
examining
explore
fields/disciplines

formulate policies - Meta
give attention to
global analyses
identifies - Meta
integrate technology and human values
investigate(s) - Meta
judgments (ethical)
justification (policies) - Meta
methodologies
moral analysis
new possibilities (evaluate)
problem analysis
problem solving approach
procedures
proposing conceptual frameworks
provide analysis
provide conclusions
scenario analysis
strategic analyses
study (extended)
study (intensive)
study/studies (systematic) - Meta
systematic use
tactical solutions
theories
use analyses

Frames Pattern

Internet ethics
Kantianism (rationalist)
applied (ethics)
choices (principled)
code(s) of ethics
codes of conduct
collective practice
computer environmental technoethics
computing/computer law
conceptual evaluations
conceptualizations
corporate ethics
cyberethics
defensible ethical criteria
defensible ethical principles
economic dimensions (life)
educational programs
engineering ethics
entropy is elemental
experience (job)
globally
individual practice
information is elemental
interest
law (discipline)
legal advice
legal boundaries
legal dimensions (life)
media ethics
military technoethics
moral considerations
moral insight
moral norms
nanoethics
nature of moral judgment
netiquette
new thinking
normative concepts
normative guidelines

normative theories
normative value theory
nuclear ethics
philosophical disciplines
philosophy (discipline)
political dimensions (life)
possible harm
practice(s) (professional)
principles
problems (general)
professional ethics
psychology (discipline)
psychology of computing
public policy
related fields/other branches
religious dimensions (life)
research (general)
rules
rules (ethical)
scholarship (general)
skill (job)
sociology (discipline)
sociology of computing
standards (industrial)
standards (professional)
standards (software development)
standards of practice
talent (job)
technoethics
technology assessment
theoretical notions
traditional ethical theories
utilitarianism
values
values (ethical)
values (moral)
values (professional)
virtue ethics

APPENDIX F: THEMATIC MAP

Interdisciplinary Theme

Disciplines
computing/computer law
educational programs
law (discipline)
philosophical disciplines
philosophy (discipline)
psychology (discipline)
psychology of computing
related fields/other branches
research (general)
scholarship (general)
sociology (discipline)
sociology of computing
technology assessment
Ethics
Internet ethics
applied (ethics)
computer environmental technoethics
corporate ethics
cyberethics
engineering ethics
media ethics
military technoethics
nanoethics
nuclear ethics
professional ethics
technoethics
virtue ethics
Theories
Kantianism (rationalist)
conceptual evaluations
conceptualizations
normative concepts
normative theories
normative value theory
theoretical notions
traditional ethical theories
utilitarianism

Collaborative Theme

Life/General
economic dimensions (life)
entropy is elemental
globally
information is elemental
interest
legal dimensions (life)
nature of moral judgment
new thinking
political dimensions (life)
possible harm
problems (general)
religious dimensions (life)
Work
collective practice
experience (job)
individual practice
practice(s) (professional)
skill (job)
talent (job)

Codes/Principles/Considerations
choices (principled)
code(s) of ethics
codes of conduct
defensible ethical criteria
defensible ethical principles
legal advice
legal boundaries
moral considerations
moral insight
moral norms
netiquette
normative guidelines
principles
public policy
rules
rules (ethical)
standards (industrial)
standards (professional)
standards (software development)
standards of practice
values
values (ethical)
values (moral)
values (professional)

Scholars and Professionals Theme

Professions
computer scientists
computing professionals
engineers
philosophers
practitioners
profession (as in those of the profession)
professionals
public policy makers
scholars
social scientists
Work
clients
coworkers
customers
employees
employers

Methodically Study Theme

Approach
application (action)
applied (as in used)
bottom-up procedure
collaborative work
concepts
criteria
democracy (co-creates)
fields/disciplines
methodologies
problem solving approach
procedures
systematic use
theories
Analysis/Study
analyses
analysis (extended)
analysis (intensive)
analyze/analyzes - Meta
global analyses
moral analysis
problem analysis
provide analysis
scenario analysis
strategic analyses
use analyses
study (extended)
study (intensive)
study/studies (systematic) - Meta
attention
give attention to
evaluates - Meta
examines - Meta
examining
explore
investigate(s) - Meta
new possibilities (evaluate)

Describe/Identify
describes - Meta
ethical issues (clarify)
identifies - Meta
Tools
analogical reasoning
case studies
cases
arguments
judgments (ethical)
Outcomes
determines
develops - Meta
ethical problems (solving)
ethical problems (understanding)
formulate policies - Meta
integrate technology and human values
justification (policies) - Meta
proposing conceptual frameworks
provide conclusions
tactical solutions

Practically Affect Theme

actions/conduct
activities
advertisement (action)
advocacy
analogous issues
arrangements
beings
choices
communication processes
computer crime
computers(ing) in the workplace
computing context
computing discipline
conditions
construction of the self
crime
cyber-stalking
cybercrime
data acquisition
data dissemination
data distribution
data interactions
data processing
data storage
decision-making (ethically informed)
decision-making (moral)
decision-making/decisions
design
design features
design processes
development/create
digital vandalism
dilemmas
e-conflicts
email privacy
ethical aspects
ethical cases
ethical dilemmas
ethical problems
ethical problems (aggravated/exaggerated)
ethical problems (created/new)
ethical problems (transformed/convert)

ethical questions (real-life)
facts
globalization
guidelines
hacking
harmful ways
health
identity theft
impact (ethical)
impact (global)
impact (legal)
impact (moral)
impact (rights)
impact (social)
impact on behavior evaluation
impact on contemporary life
impact on democracy
impact on employment/work
impact on environment
impact on freedom
impact on health
impact on human life
impact on human values
impact on knowledge
impact on opportunity
impact on privacy
impact on security
impact on self-fulfillment
impact on social values
impact on wealth
implementation
individuality
infoglut/research ethics
innovation (large scale)
interactions
issues (ethical)
issues (general)
issues (legal)
issues (moral)
issues (political)
issues (social)
laws

legislation
lifecycle (development process)
management
moral dilemmas
moral outcomes
moral practices
moral problems (exacerbated)
moral problems (new versions)
moral questions
nature of computer technology
nature of moral action
new capabilities
new choices (for action)
personal dilemmas
policies
policies (social)
pornography
problems (future generations)
problems (human rights)
problems (intellectual property)
problems (practical)
producing documentation
proliferation
propaganda

regulation
relationships
research (large scale)
research (nanotechnology)
responsibility (moral)
responsibility (professional)
responsibility(ies)
roboethics/moral status of artificial agents
rules
selling to totalitarian government
situations
software development
standards of conduct
systems interaction
transformations
uncharted realms
usage regulations
use
use (ethical)
use (military)
viruses
working conditions
writing code

Contributions and Costs Theme

access/participation
accountability
adopting legislation
advance technology
affect discourse
affect policies
affect practices
anonymity
choice/consent
commitment to the user
conceptual muddles (address)
conceptual vacuums (fill)
concern (public)
concern for the user
concern(s)
concerns (practical)
contribution (benefit)
democracy (result of)
derivative commitment
develop consensus
develop legislation
digital divide
element at play (because IT is an element in play)
employment
enforcement/redress
ethics (general) (because it informs ethics)
evaluation
exclusive advantage
expression/censorship
formulate policies
guide collective action
guide individual action
human cost
impact (general)
impact on codes of conduct
impact on social arrangements
impact on social institutions
impact on social practices
information accessibility
information accuracy

information availability
information environment
information privacy
information property
information society
informed consent
informs actions
informs decisions
infosphere
integrity/security
intellectual property
justice
legislation
metaethics (of computer ethics)
minimized risk
monitoring/surveillance
moral commitment
not damage human values
notice/awareness
online (Internet) privacy
ownership/piracy
panmnemonic issues/personal identity
policies
policy vacuums (fill)
prevent (mis)use
privacy
promote discussions
proportionality
protect human values
reliability
safety
security/secrecy
sensitizing politicians
sensitizing professionals
sensitizing public opinion
solving educational problems
solving technical problems
standards (technical)
trustworthiness

Computing Artifacts Theme

(computer) hardware	design documents
(computer) networks	engineering
(computer) software	feasibility studies
ICT	graphic interfaces
Internet	information
advertisements	information objects
all products of system development	information systems
applications (software)	information technology
artificial intelligence	laws
artificial agents	manuals
changing technology	mass media
communication devices	policies
communication technology	products of practice
complex systems	program documentation
computational technology	robotics
computer artifacts	source code
computer operation	system maintenance manuals
computer science	technology
computer systems	test cases
computer technology	test plans
computer(s)	true patient
computing and information technology	universal patient
computing artifact(s)	power
computing devices	user manuals
cybertechnology	visual technology

Global Society Theme

affected individuals	people (unprotected)
collective (the)	people (vulnerable)
computer users	people (weak)
global society	public (the)
groups	slaves (to the few)
individual(s)	society
people (healthy)	users
people (peripheral of power centers)	
people (poor)	
people (powerless)	
people (rich)	
people (sick)	
people (strong)	

APPENDIX G: ARTICLE DATA SET 2009-2012

Title	Author(s)	Year	Publication
'You've just been disarmed. Have a nice day!"	Canning, J.,	2009	IEEE Tech & Society Mag.
Death strikes from the sky: the calculus of proportionality	Sharkey, N.,	2009	IEEE Tech & Society Mag.
Modeling the moral user	Asaro, P.M.,	2009	IEEE Tech & Society Mag.
Predators or plowshares? arms control of robotic weapons	Sparrow, R.,	2009	IEEE Tech & Society Mag.
Ethical robots in warfare	Arkin, R.C.,	2009	IEEE Tech & Society Mag.
Commercializing public sector information privacy and security concerns	Burdon, M.,	2009	IEEE Tech & Society Mag.
The internet and the changing nature of intelligence	Resnyansky, L.,	2009	IEEE Tech & Society Mag.
Interpersonal communication and gender in the ICT profession	Kirlidog, M.; Aykol, M.; Gulsecen, S.,	2009	IEEE Tech & Society Mag.
Innovation as energy policy for the world	Andrews, C.J.,	2009	IEEE Tech & Society Mag.
Citizens, groups, communities, and information and communication technologies	O'Donnell, S.; McIver, W.,	2009	IEEE Tech & Society Mag.
Wireless nomad: Pioneer in an urban residential environment	Wong, M.A.,	2009	IEEE Tech & Society Mag.
Video communication roadblocks facing remote indigenous communities	O'Donnell, S.; Perley, S.; Simms, D.; Hancock, B.,	2009	IEEE Tech & Society Mag.
K-Net and Canadian Aboriginal communities	Fiser, A.; Clement, A.,	2009	IEEE Tech & Society Mag.
Communication technology, emergency alerts, and campus safety	Gow, G.A.; McGee, T.; Townsend, D.; Anderson, P.; Varnhagen, S.,	2009	IEEE Tech & Society Mag.
Technology and connections Mexican immigrants in the U.S.	Gonzalez, V.; Castro, L.A.; Rodriguez, M.,	2009	IEEE Tech & Society Mag.
Conflict and consensus in the Chinese version of Wikipedia	Han-Teng Liao,	2009	IEEE Tech & Society Mag.
Wiki deployment in corporate settings	Arazy, O.; Gellatly, I.; Soobaek Jang; Patterson, R.,	2009	IEEE Tech & Society Mag.
Keyloggers	Sagiroglu, S.; Canbek, G.,	2009	IEEE Tech & Society Mag.
Computer-assisted medical diagnosis for rural Sub-Saharan Africa	Friedman, E.A.,	2009	IEEE Tech & Society Mag.

Title	Author(s)	Year	Publication
Learning from disasters	van der Voort, H.; de Bruijn, H.,	2009	IEEE Tech & Society Mag.
Mental models of privacy and security	Camp, L.J.,	2009	IEEE Tech & Society Mag.
Good computing	Huff, C.; Barnard, L.,	2009	IEEE Tech & Society Mag.
Privacy management service contacts as business opportunity	Pau, L-f,	2009	IEEE Tech & Society Mag.
Greening IEEE	Meyer, P.E.,	2009	IEEE Tech & Society Mag.
Engineering for humanitarian development	Amadei, B.; Wallace, W.A.,	2009	IEEE Tech & Society Mag.
Assessing experiences of international students in Haiti and Benin	Silliman, S.,	2009	IEEE Tech & Society Mag.
Linking technologists and humanitarians	Perusich, K.; Tepper, H.; de Marca, J.R.B.; Lefevre, R.; Baseil, R.,	2009	IEEE Tech & Society Mag.
International humanitarian engineering	Vandersteen, J. D J; Baillie, C.; Hall, K.,	2009	IEEE Tech & Society Mag.
Engineering to help	Schneider, J.; Lucena, J.; Leydens, J.A.,	2009	IEEE Tech & Society Mag.
Volunteerism and Humanitarian Engineering - Part II	Didier, C.; Herkert, J.R.,	2010	IEEE Tech & Society Mag.
Humanitarian Engineering in Spain: Ingenieros sin Fronteras	Canavate, J.; Casasus, J.,	2010	IEEE Tech & Society Mag.
Ingenieurs Sans Frontieres in France: From Humanitarian Ideals to Engineering Ethics	Paye, S.,	2010	IEEE Tech & Society Mag.
From Boy Scouts and Missionaries, to Development Partners	Meganck, M.,	2010	IEEE Tech & Society Mag.
Disability and Technology: Engineering a More Equitable Ireland	Burker, T.; de Paor, A.; Coyle, E.,	2010	IEEE Tech & Society Mag.
Telehealth in Sub-Saharan Africa: Lessons for Humanitarian Engineering	Foster, K.R.,	2010	IEEE Tech & Society Mag.
PIPWatch Toolbar: Using Social Navigation to Enhance Privacy Protection and Compliance	Clement, A.; Ley, D.; Costantino, T.; Kurtz, D.; Tissenbaum, M.,	2010	IEEE Tech & Society Mag.
Knowledge-Sharing Successes in Web 2.0 Communities	Allen, J.P.,	2010	IEEE Tech & Society Mag.
Challenge of the Digital Revolution: Mediating the Two Cultures Divide	Zessner, W.,	2010	IEEE Tech & Society Mag.

Title	Author(s)	Year	Publication
Toward a State of Überveillance	Michael, M. G.; Michael, K.,	2010	IEEE Tech & Society Mag.
What is Überveillance? (And What Should Be Done About It?)	Clarke, R.,	2010	IEEE Tech & Society Mag.
Opposing Surveillance	Martin, B.,	2010	IEEE Tech & Society Mag.
Owning Identity- One or Many-Do We Have a Choice?	Wigan, M.,	2010	IEEE Tech & Society Mag.
Privacy Implications of Automated GPS Tracking and Profiling	Iqbal, M.U.; Samsung Lim,	2010	IEEE Tech & Society Mag.
Designing a Low-Cost, Electricity-Generating Cooking Stove	Riley, P.H.; Saha, C.; Johnson, C.J.,	2010	IEEE Tech & Society Mag.
Strengthening Governments to Formulate Integrated Digital Strategies	Metaxiotis, K.; Larios, Y.; Assimakopoulos, V.,	2010	IEEE Tech & Society Mag.
Technology and Democracy... You Can't Get There from Here	Ivory, M.,	2010	IEEE Tech & Society Mag.
Social Implications of Pursuing Sustainability	Andrews, C.J.,	2010	IEEE Tech & Society Mag.
Standing in the Way: Sustainable Future vs. Sloth, Genes, and Entropy	Robbins, J.,	2010	IEEE Tech & Society Mag.
Historical Trends in Global Energy Consumption	Mattick, C.S.; Williams, E.; Allenby, B.R.,	2010	IEEE Tech & Society Mag.
Designing for Sustainability: Negotiating Ethical Implications	Oram, D.,	2010	IEEE Tech & Society Mag.
Understanding Sustainability Through Reverse Engineering	Dempere, L.A.,	2010	IEEE Tech & Society Mag.
Sustainable Energy and Environmental Policymaking in Japan	Matsuura, M.; Shiroyama, H.; Suzuki, T.,	2010	IEEE Tech & Society Mag.
Business Constraints in Reuse Services	Matsumoto, M.; Nakamura, N.; Takenaka, T.,	2010	IEEE Tech & Society Mag.
Engineering Case Studies: Bridging Micro and Macro Ethics	Kline, R.R.,	2010	IEEE Tech & Society Mag.
Protecting Electrical Technology Through Patents	Winarski, T.,	2010	IEEE Tech & Society Mag.
Climate Change, Technology, and Sustainability	Hasna, A.M.,	2010	IEEE Tech & Society Mag.
Plagiarism-Detection Services: How Well Do They Actually Perform?	Fiedler, R.L.; Kaner, C.,	2010	IEEE Tech & Society Mag.
Security Threats and Mitigating Risk for USB Devices	Tetmeyer, A.; Saiedian, H.,	2010	IEEE Tech & Society Mag.
Exploring the Professional Status of Software Work in India	Malish, C. M.; Ilavarasan, P.V.,	2010	IEEE Tech & Society Mag.

Title	Author(s)	Year	Publication
High-Tech R and D Networks: Nanotech Enterprises in Iran	Yazdi, F.S.; Sepehri, M.M.; Teimourpour, B.; Bahreini, M.A.,	2011	IEEE Tech & Society Mag.
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Investigating internet usage as innovation adoption: a quantitative study	Prodromos D. Chatzoglou, Eftichia Vraimaki	2010	JICES
A new "Ring of Gyges" and the meaning of invisibility in the information revolution	Ugo Pagallo	2010	JICES
The counter-control revolution: "silent control" of individuals through dataveillance systems	Yohko Orito	2011	JICES
Moral judgment in computing undergraduates	Suzy Jagger	2011	JICES
Freelance technical writers: does temporary work promote ethical issues?	Kathy Brady	2011	JICES
Ethical assessment of new technologies: a meta-methodology	Ian Harris, Richard C. Jennings, David Pullinger, Simon Rogerson, Penny Duquenoy	2011	JICES
Even greener IT: Bringing green theory and "green IT" together, or why concern about greenhouse gasses is only a starting point	N. Ben Fairweather	2011	JICES
A critical contribution to theoretical foundations of privacy studies	Thomas Allmer	2011	JICES
Online CSR reportage of award-winning versus non award-winning banks in Ghana	Robert Ebo Hinson	2011	JICES
Do higher education computing degree courses develop the level of moral judgement required from a profession?	Lynda Holland	2011	JICES
What are we doing?: Microblogging, the ordinary private, and the primacy of the present	Mark Coeckelbergh	2011	JICES
IT for a better future: how to integrate ethics, politics and innovation	Bernd Carsten Stahl	2011	JICES
Toward a normative ethics for technology development	Stephen Rainey, Philippe Goujon	2011	JICES
Regulating the future? Law, ethics, and emerging technologies	Iván Székely, Máté Dániel Szabó, Beatrix Vissy	2011	JICES
Forced pirates and the ethics of digital film	Nico Meissner	2011	JICES
The portable panopticon: morality and mobile technologies	Martin De Saulles, David S. Horner	2011	JICES

Title	Author(s)	Year	Publication
Towards an alternative concept of privacy	Christian Fuchs	2011	JICES
Seniors extend understanding of what constitutes universal values	Oliver K. Burmeister, John Weckert, Kirsty Williamson	2011	JICES
The role of credibility in the design of mobile solutions to enhance the social skill-set of teenagers diagnosed with autism	Anne Gerdes, Peter Øhrstrøm	2011	JICES
Mechanisms for stakeholder co-ordination in ICT and ageing	Rachel L. Finn, David Wright	2011	JICES
The jobs of others: "speculative interdisciplinarity" as a pitfall for impact analysis	Michael Rader	2012	JICES
A Walzerian approach to ICTs and the good life	Pak-Hang Wong	2012	JICES
Ethics in the bank internet encounter: an explorative study	Jacob Dahl Rendtorff, Jan Mattsson	2012	JICES
The creation of the Knowledge Zone of Curaçao: the power of a vision	Miguel Goede, Rostam J. Neuwirth, G. Louisa	2012	JICES
How to abuse biometric passport systems	Olli I. Heimo, Antti Hakkala, Kai K. Kimppa	2012	JICES
Revealing the commercialized and compliant Facebook user	Stephen Lilley, Frances S. Grodzinsky, Andra Gumbus	2012	JICES
A library is not the books: an ethical obstacle to the digital library	James M. Donovan	2012	JICES
Gender issues in information and communication technologies (ICTs)	Wieslaw Oleksy, Edyta Just, Kaja Zapedowska-Kling	2012	JICES
The future of computer ethics 12 years after: in memory of Alessandro D'Atri	Antonio Marturano	2012	JICES
Strategic information systems and the reconfiguration of value space: a case study of Yoox	Andrea Resca, Alessandro D'Atri	2012	JICES
Critical systemic thinking as a foundation for information systems research practice	Peter M. Bednar, Christine Welch	2012	JICES
Social dimension in ERP adoption and implementation: The evolution of Organizational Identity after an M&A	Luigi De Bernardis	2012	JICES
Organizational trust in a networked world: Analysis of the interplay between social factors and Information and Communication Technology	Luca Giustiniano, Francesco Bolici	2012	JICES

Title	Author(s)	Year	Publication
Contesting methodologies: Evaluating focus group and privacy diary methods in a study of on-line privacy	Danijela Bogdanovic, Michael Dowd, Eileen Wattam, Alison Adam	2012	JICES
Ethical implications of the mediatization of organizations	Michael Litschka, Matthias Karmasin	2012	JICES
Attitudes towards information ethics: a view from Egypt	Omar E.M. Khalil, Ahmed A.S. Seleim	2012	JICES
Technophilia, neo-Luddism, eDependency and the judgement of Thamus	Darryl Coulthard, Susan Keller	2012	JICES
"Right to Information Act" - a tool for good governance through ICT	Shalini Singh, Bhaskar Karn	2012	JICES
Privacy in new media in Israel: How social networks are helping to shape the perception of privacy in Israeli society	Yuval Karniel, Amit Lavie-Dinur	2012	JICES

APPENDIX H: SUBJECT MATTER CODEBOOK

Code (*Subject Matter*)	**Application Count**
Interdisciplinary Theme	
Disciplines	
IT education	1
IT law	1
biotechnology	1
computer and information ethics	1
computer science	1
computers and society	1
engineering	1
information systems	2
information technology	1
interdisciplinary research	1
mathematics	1
medical research	1
privacy studies	1
Ethics	
ICT-driven ethics	1
Islamic ethics	1
business ethics	1
computer ethics	3
engineering ethics	1
ethics	14
human ethics	1
information ethics	2
intercultural information ethics	1
internet research ethics	1
macro ethics	1
micro ethics	1
normative ethics	1
research ethics	1
robotics ethics	1
video game ethics	1
Theories	
Amartya Sen's capability approach	3
Amartya Sen's ethical theories	2
Aristotelian friendship	2
Debordian	1
Gandhi's thoughts	2

Code (*Subject Matter*)	**Application Count**
Just Consequentialism	1
Moor's "Towards a theory of privacy in the information age"	1
Nissenbaum's theory of contextual integrity	1
Precautionary Principle	1
Rawlsian principles of justice	1
Walzerian approach	1
Wiener's thoughts	1
critical theory	1
design contractualism	1
diffuse, default model	1
green theory	1
neo-Luddism	1
normative (theories)	3
pragmatism	1
theoretical foundations	2
virtues (Aristotelian theory)	1
Collaborative Theme	
Codes/Principles/Considerations	
PAPA	1
Right to Information Act	1
alternative research framework	1
code of ethics	1
comprehensive model	1
design-based reseach principles	1
ethical framework	1
ethical perspectives	1
etiquette	1
humanitarian ideals	1
law	1
mainstream vision	1
moral consideration	1
morality	3
morality (human)	1
philosophical considerations	1
pledge	1
policies (public)	1
rules	1
rules (bureaucratic)	1
rules (moral)	1
social contract	1

Code (*Subject Matter*)	**Application Count**
the virtues	1
universal model	1
values	1
values (situated)	1
values (socially exclusive)	1
values (universal)	1
vision	1
Life/General	
age	1
aging	2
agreeing	1
anomia	1
biculturalism	1
bridging	3
capabilities (human)	1
capabilities/capacity	4
class	1
co-exist	1
co-ordination	1
cooperative	1
cracking down	1
critical perspectives	1
cultural dimensions/differences	2
dual labour markets	1
economic dimensions/realities	3
emotions	1
end-user perspective	1
factors	1
factors (social)	1
fantasy	1
gender	3
integration	2
interests (corporate)	1
interests (media)	1
intersectionality	1
linking	1
living together	1
needs	1
pioneer	1
political dimensions/politics	2

Code (*Subject Matter*)	**Application Count**
practicality	1
race	1
reality	5
role	4
social dimensions	2
social-relational	1
Work	
IT work	1
cooperative architectures	1
cooperative workflows	1
interpersonal communication	1
multitasking	1
non-formal business	1
professional	1
software work	1
temporary work	1
Scholars and Professionals Theme	
Boy Scouts	1
Development Partners	1
ICT profession	1
IEEE	1
Missionaries	1
computing professional	1
computing professions	2
contributors (open source)	1
designers	1
engineers without borders	2
gamers/players	3
humanitarians	1
institutional review board	1
instructors	1
international students	1
moral entrepreneurs	1
nanotech enterprises	1
policy makers	1
research practice	1
stakeholders	3
students	1
technical writers (freelance)	1
technologists	1

Code (*Subject Matter*)	**Application Count**
technology students	1
Methodically Study Theme	
address	2
analogies	7
analysis	3
analysis (empirical)	1
analysis (moral)	1
analysis (ontological)	1
anticipating	1
apply(ing)	2
argue(ments)	1
assess (performance)	1
assess(ment)	2
assessment (ethical)	1
associating	1
bibliometric mapping	1
bring together	1
calculus	1
case studies	5
case(s)	3
comparing	1
conceptual rethinking	1
conceptualizing	2
contribute (study)	1
critical systemic thinking	1
critique	1
current trends	1
deal with	1
defend	2
definition/defines/defining	1
develop (study)	1
diary method	1
elicitation	1
empirical rethinking	1
engaging	2
ethical discourse	1
evaluate/evaluation	4
evaluation (ethical)	1
evaluation (moral)	1
examples	1

Code (*Subject Matter*)	**Application Count**
explore	4
exposition	1
fiction	1
focus group method	1
formulate	1
framework	1
historical trends	1
human environmentalist approach	1
impact analysis	1
interdisciplinary approach	1
introduce (introduction)	1
investigate	1
justification	1
learning	1
lessons	1
leveraging	1
make explicit	1
meaning	2
mediating	1
mental models	1
meta-methodology	1
metaphors (moral)	1
methodological reflection	1
modeling (social)	1
negotiating	1
novel approach	1
participation	1
personal portfolios	1
precaution	1
privacy impact assessments (PIAs)	1
promoting	2
puzzling	1
question(s)	1
realisation	1
reassessing	1
recognizing	1
reply	1
resolving	2
rethinking	1
returning	1

Code (*Subject Matter*)	**Application Count**
reveal(ing)	2
reverse engineering	1
revisit	2
scenarios	1
simulation	1
strengthening	1
structuring	1
study (quantitative)	1
study/studying	4
successes	1
teach	1
thinking	1
topography	1
understand(ing)	5
Practically Affect Theme	
“silent control”	1
ERP adoption/implementation	1
ICT pollution	1
RoboWarfare	1
archiving the self/biography	1
arms control	1
attitudes	2
automating surveillance	1
awareness (ethical)	1
body odor authentication	1
challenge(s)	5
challenges (ethical)	2
challenges (methodological)	1
character friendship	1
choices (context-sensitive)	1
choices (ethical)	1
communicative connection	1
computer security	1
computing	1
content moderation	1
contestability	2
corporate capabilities	1
corporiate social responsibility	1
crashing (ruining)	1
creativity	1

Code (*Subject Matter*)	**Application Count**
credibility	1
criteria for moral agency	1
cyber-attacks	1
data protection	1
deception detection	1
decision making	2
decision making (ethical)	1
decision making (moral)	1
decisions (virtual)	1
democracy	2
deployment	1
design/development/model/creation	19
digitalized warfare	1
dilemma(s)	2
dilemmas (ethical)	2
disability	2
disaster management	1
disasters	1
discriminatin/proportionality	1
duties (software)	1
e-exclusion	1
e-inclusion	2
e-policing	1
e-trust	3
economics	1
elections	1
electronic exhibitionism	1
emergencies (national)	1
engineering (the act of)	2
environmental policymaking	1
ethical agency	1
ethical frontiers	1
evaluation network size	1
experiements	1
experiences	1
explanation	1
failure to punish	1
file sharing	2
freedom(s)	1
friendship	5

Code (*Subject Matter*)	**Application Count**
future evolution/evolution	2
gameplay (ethical)	1
globalization	1
governing	1
identify theft education	1
identity (affect)	4
identity management	1
implications (persuasion processes)	1
implications (social)	1
information sharing (ethical)	1
information, knowledge, wisdom	1
innovation adoption	1
internet content filtering	1
interplay	1
invisibility	1
issues (cultural)	1
issues (current)	1
issues (ethical)	6
issues (gender)	1
issues (pragmatic)	1
issues (trust)	1
issues/implications (privacy)	3
judgment (moral)	2
knowledge	1
knowledge production	1
knowledge-sharing	1
mediatization	1
microblogging	1
minimizing risks	1
mitigating risk	1
monsters	1
moral agency	1
moral appearances	1
moral identities	1
music downloading	1
national security	2
normative structure	1
obstacles	1
obstacles (ethical)	1
online communication outcomes	1

Code (*Subject Matter*)	**Application Count**
organizational identity	1
perception management	1
pervasive/affective computing	2
plagiarism	1
planning	1
politics	1
power	2
power relations	1
practical identities	1
practices (current)	1
practices (good)	1
privacy (concept of)	2
privacy (informational)	1
privacy advocacy	1
privacy compliance	1
privacy management	1
privacy protection	1
qualities (moral)	1
regulation(s)	4
relation/relationships	3
relational maintenance	1
reporting	2
reputation	1
respect for persons	1
responsibility	1
responsibility (ethical)	1
responsibility (legal)	1
responsibility (moral)	2
responsibility (social)	2
right(s)	3
rights (human)	1
rights (individual privacy)	2
rights (individual)	1
rights (intellectual property)	1
rights (privacy)	1
rights (robot)	1
rights (software)	1
roadblocks	1
securing privacy	1
sharing	1

Code (*Subject Matter*)	**Application Count**
social entrepreneurship	1
social exclusion	1
social inclusion	2
social meaning	1
solutions (privacy)	1
stakeholder management	1
strategies/approaches	1
student assessment	1
surveillance (affect)	1
sustainable energy	1
teaching computer ethics	1
technophilia	1
the consent process	1
transparency (affect)	1
transparency (dynamic)	1
transparency (information)	1
transparency difficulties	1
transparency rights	1
trust	9
trust (organizational)	1
truth	1
use	10
use (ethical)	1
use (managing)	1
verbing micro-practices	1
virtual theft	1
voyeurism (electronic)	1
voyeurism (perfect)	1
warfare	1
Überveillance (affect)	1
Contributions and Costs Theme	
ICT-mediated collaborations	1
RFID-enabled authentication	1
abuse	1
acceptance	1
access	3
accessibility (web)	1
accidents	1
addiction	1
advantages	1

Code (*Subject Matter*)	**Application Count**
affordability	1
arming	1
artificial intelligence (AI)	1
autonomy (personal)	1
awards	1
banality	1
benefit(s)	2
benefits (social)	1
better future	1
biomedical engineering education	1
business constraints	1
business opportunity	1
campus safety	1
cell-phone-enabled empowerment	1
change(s)	2
choice	2
classroom visual accessibililty	1
climate change	1
coercion	1
cognitive justice	1
commercializing	2
communicate	1
compliance risks	1
compliant/compliance	1
conceptual muddles	1
concerns	2
concerns (ethical)	1
confidence	1
conflict	1
consensus	1
consent (contextualized)	1
consequences	2
consequences (workplace)	1
contextual gaps	1
contribute (cont/cost)	1
corporate/organizational citizenship	2
counter-control revolution	1
crime	1
death	1
decreasing marginal value	1

Code (*Subject Matter*)	**Application Count**
dementia	1
demise of truth	1
depressive behavior	1
development (cont/cost)	2
diffusion	1
digital divide (gender)	1
digital divide(s)	5
digital revolution	1
digital strategies	1
e-commerce	1
eDependency	1
earnings	1
education	1
electricity-generating	1
emancipation	2
emergency alerts	1
empowerment	1
energy consumption	2
engineering to help (ETH)	1
entanglement	1
entropy	1
equality	1
equity	2
fair(ness)	1
fallout	1
flourishing	1
freedom (expanded)	1
good	2
good governance	1
good intentions go bad	1
greenhouse gasses	1
harm(s)	1
help	2
higher education	2
human development	1
human enhancement	1
humanitarian effort	1
humanitarian engineering/development	5
impact (ethical)	1
impact (general)	1

Code (*Subject Matter*)	**Application Count**
implications (ethical)	6
implications (general)	1
implications (social)	1
inaccuracy	1
information justice	4
information revolution	1
innovation	2
interception	1
knowledge gap(s)	1
legitimacy	1
lethal behavior	1
liability	1
livelihood assets	1
low-cost	1
mainstreaming	1
merger/acquisition	1
misdirection	1
moral distinction	1
moral luck	1
move forward	1
new industrial revolution	1
notice	1
online behavior	1
open-ness	2
opportunity	1
organizational justice	1
ownership (private)	1
perception	3
personhood	1
pitfall	1
policies	1
policies (ICT)	2
policies (energy)	1
privacy	23
privacy enhancement	1
profiling	1
progress	1
property	1
protect(ing)	1
rational discrimination	1

Code (*Subject Matter*)	**Application Count**
reconfiguration	1
reflect	1
relational memory	1
responsiblities	1
risk	1
safety	2
scientific revolution	1
security (cont/cost)	4
security threats	1
social e-inclusion	1
social memory	1
social networks	1
social skills	1
suicide	1
surveillance (cont/cost)	2
sustainability (environmental)	1
sustainability (general)	7
the future	2
the good life	2
tracking	1
transformation	1
transparency (cont/cost)	2
transparency threats	1
two cultures divide	1
vacuums (privacy)	1
value (prudential)	1
volunteerism	1
vulnerabilities	2
Überveillance (cont/cost)	2
Computing Artifacts	1
$100 laptop	2
(Google) Street View	4
3D virtual learning environment	1
CRM-IS	1
DNA databanks/dataveillance	2
FOSS policy	1
Facebook	9
FarmVille	1
GPS (automated)	1
Google	1

Code (*Subject Matter*)	**Application Count**
ICT programs	1
ICT(s)	23
ID scanners	1
Internet	7
Internet (next generation)	1
Knowledge Zone	1
Kuh-Ke-Nah Network (K-Net)	1
MMORPGs	2
One Laptop per Child	1
PIPWatch Toolbar	1
Predator	1
RFID	1
Schubmehl-Prein essay competition	2
Transafe	1
Turnitin	1
UAVs	1
USB devices	1
WiMAX	1
Wikipedia	3
Wireless Nomad	1
Yoox	1
algorithms	1
ambient intelligence	2
artificial agent(s)	3
autonomous systems	1
autonomous urban land vehicles	1
autonomy	1
avatar creation interfaces	1
biometrics	2
blog/shop	1
bots	1
cell-phones	1
collective awareness platforms	1
communication technology	1
community telecenter	1
computer(s)	2
computer-assisted medical diagnosis	1
computer-mediated communication	1
computer-patient interfaces	1
computing degree courses	1

Code (*Subject Matter*)	**Application Count**
connections	1
cooking stove	1
crowdsourced mobile platform	1
cyber cafés	1
cyberspace/web space/(online) environment	9
cyborg	1
data (public)	1
datacenters	1
dataveillance systems	1
decision support systems	2
digital film	1
digital information	1
drones	1
electrical technology	1
electronic books/digital library	2
electronic media	1
emerging/new technologies	4
ethical robots	3
expert information systems	1
extended agencies	1
green IT	1
health searches	1
human-computer interaction	1
iREACH	1
identity (artifact)	1
identity management systems	1
inexpensive laptops	1
information and (its) communication	1
information technology	6
intelligence (nature of)	1
internet encounter	1
internet information	1
keyloggers	1
learning machine	1
learning tools	1
lethal systems	1
lightning protection	1
location-based social networking	1
mechanisms	1
mobile technologies/solutions	2

Code (*Subject Matter*)	**Application Count**
moral user	1
multi-agent systems	1
nanotechnology	1
networks	1
networks (collaborative)	1
networks (high-tech R and D)	1
new media	2
new social media	1
online graduate degree	1
online multiplayer computer games	1
passport systems	1
patents	1
plagiarism-detection services	1
profiling algorithms	1
public information	1
reuse services	1
robot care(givers)	2
robot minds	1
robotic weapons	1
robotics	1
robots	4
robots with biological brains	1
search	1
security (artifact)	1
service contracts	1
services	2
simulated evil	1
smart grids	1
smartphone recordings	1
social navigation	1
social network sites/technology	8
software	1
software (convivial)	1
software (free)	6
software (open source)	4
software (proprietary)	1
strategic information systems	1
studiVZ	1
technology	14
telecommunications	1

Code (*Subject Matter*)	**Application Count**
telehealth	1
telephone	1
the N-reasons platform	1
the Web	1
the cloud	1
tools	1
uninhabited systems	1
universal service	1
video communication	1
video game imagery	1
video games (violent)	1
virtual friendship	2
virtual funeral	1
virtual institutions	1
virtual murder	1
virtual paedophilia/pedophilia	1
virtual worlds	3
virtual/unreal crimes	2
virtual/unreal punishments	2
virtuous machines	1
web 2.0 tools	1
web sites	2
web sites (political party)	1
wikis	1
Global Society Theme	
21st Century	1
Aboriginal communities	1
Age (Information)	3
Age (anti-terror)	1
Age (digital)	2
Aotearoa/New Zealand	1
Australia	3
Benin	1
Canada	1
Catalan	1
China (Chinese)	1
Curaçao	1
Desert	1
Egypt	2
Europe	2

Code (*Subject Matter*)	**Application Count**
France	1
Ghana	1
Greece	1
Haiti	1
India	3
Indian women	1
Iran	2
Ireland	1
Israel	1
Japan	2
Mexican	1
Pan-European	1
Portugal	1
South Africa	2
Spain	1
Sub-Saharan Africa	2
Sweden	1
U.S.	3
Web 2.0 communities	1
a world	2
aging populace	1
all	1
banks	2
business/corporate	2
citizens	1
citizens (senior)	1
civilian realm	1
common world	1
communities	1
computing undergraduates	1
corporate settings	1
developing contexts	1
developing countries/nations	3
elderly/seniors	3
fireworks industries	1
football fans	1
global	4
globalized world	1
governments	1
groups	1

Code (*Subject Matter*)	**Application Count**
humans in battle	1
humans using controlled technology in battle	1
immigrants	1
indigenous communities	3
individuals	1
information society	3
international	1
lab	1
lifeworld	1
millennials	1
networked world	1
non-government organizations (NGO)	1
open-source communities	1
organizations	1
parents	1
peers	1
primary school children	1
public space	1
refugee youth	1
remote	2
risk society	1
rural	1
slaves (epistemic)	1
society	1
spheres	1
students (college)	3
students (female)	1
students (undergraduate)	1
teenagers (autistic)	1
the Age	1
the e-excluded	1
the innocent	1
the present	1
the surveillance society	1
the world	1
third social sector	1
ubiquitously connected world	1
urban residential environments	1
us	1
user(s)	3

Code (*Subject Matter*)	**Application Count**
users (older)	1
value space	1
virtual communities	1
we	2
women	1
work/workplace	2

APPENDIX I: TOPIC PATTERNS BY JOURNAL

ACM Computers and Society

Code (*ACM Computers and Society*)	**Count**
use	5
privacy	4
(Google) Street View	4
ICT(s)	3
ethics	2
Gandhi's thoughts	2
address	2
design/development/model/creation	2
rights (individual privacy)	2
implications (ethical)	2
safety	2
$100 laptop	2
Schubmehl-Prein essay competition	2
computer(s)	2
cyberspace/web space/(online) environment	2
services	2
software (free)	2
software (open source)	2
Age (Information)	2
computers and society	1
information technology	1
medical research	1
computer ethics	1
information ethics	1
intercultural information ethics	1
internet research ethics	1
video game ethics	1
Debordian	1
Just Consequentialism	1
Moor's "Towards a theory of privacy in the information age"	1
Nissenbaum's theory of contextual integrity	1
Wiener's thoughts	1
design-based reseach principles	1
pledge	1
rules	1
rules (moral)	1
bridging	1

Code (*ACM Computers and Society*)	**Count**
cooperative	1
cultural dimensions/differences	1
economic dimensions/realities	1
factors	1
reality	1
role	1
cooperative architectures	1
cooperative workflows	1
computing professional	1
computing professions	1
institutional review board	1
policy makers	1
technology students	1
analysis	1
apply(ing)	1
conceptualizing	1
engaging	1
ethical discourse	1
examples	1
interdisciplinary approach	1
leveraging	1
novel approach	1
personal portfolios	1
promoting	1
puzzling	1
recognizing	1
revisit	1
teach	1
understand(ing)	1
ICT pollution	1
attitudes	1
awareness (ethical)	1
body odor authentication	1
challenges (ethical)	1
choices (context-sensitive)	1
choices (ethical)	1
creativity	1
deception detection	1
decisions (virtual)	1
e-exclusion	1

Code (*ACM Computers and Society*)	**Count**
evaluation network size	1
identify theft education	1
issues (current)	1
issues (trust)	1
perception management	1
plagiarism	1
practices (current)	1
reporting	1
responsibility (moral)	1
responsibility (social)	1
rights (privacy)	1
sharing	1
social entrepreneurship	1
student assessment	1
teaching computer ethics	1
the consent process	1
truth	1
acceptance	1
classroom visual accessibililty	1
confidence	1
crime	1
decreasing marginal value	1
demise of truth	1
digital divide (gender)	1
education	1
humanitarian effort	1
implications (social)	1
information justice	1
knowledge gap(s)	1
liability	1
misdirection	1
move forward	1
perception	1
policies	1
privacy enhancement	1
security (cont/cost)	1
Computing Artifacts	1
3D virtual learning environment	1
DNA databanks/dataveillance	1
Facebook	1

Code (*ACM Computers and Society*)	**Count**
FarmVille	1
Internet	1
One Laptop per Child	1
Transafe	1
biometrics	1
crowdsourced mobile platform	1
electronic books/digital library	1
electronic media	1
inexpensive laptops	1
information technology	1
learning tools	1
online graduate degree	1
search	1
smartphone recordings	1
software (proprietary)	1
technology	1
the cloud	1
web 2.0 tools	1
web sites	1
Catalan	1
Japan	1
developing countries/nations	1
information society	1
parents	1
primary school children	1
public space	1
risk society	1
students (college)	1
students (female)	1
students (undergraduate)	1
the Age	1
third social sector	1
ubiquitously connected world	1
us	1

Ethics and Information Technology

Code (*Ethics and IT*)	**Count**
design/development/model/creation	8
ICT(s)	8
trust	7
ethics	5
friendship	5
privacy	5
social network sites/technology	5
capabilities/capacity	4
issues (ethical)	4
information technology	4
technology	4
Amartya Sen's capability approach	3
normative (theories)	3
reality	3
gamers/players	3
analogies	3
evaluate/evaluation	3
e-trust	3
identity (affect)	3
information justice	3
Facebook	3
artificial agent(s)	3
cyberspace/web space/(online) environment	3
robots	3
software (free)	3
virtual worlds	3
Amartya Sen's ethical theories	2
Aristotelian friendship	2
case(s)	2
challenge(s)	2
decision making	2
dilemma(s)	2
use	2
choice	2
digital divide(s)	2
transparency (cont/cost)	2
Wikipedia	2
ambient intelligence	2

Code (*Ethics and IT*)	**Count**
ethical robots	2
robot care(givers)	2
virtual friendship	2
virtual/unreal crimes	2
virtual/unreal punishments	2
a world	2
business/corporate	2
user(s)	2
IT law	1
computer and information ethics	1
information systems	1
ICT-driven ethics	1
business ethics	1
computer ethics	1
human ethics	1
research ethics	1
robotics ethics	1
Rawlsian principles of justice	1
critical theory	1
diffuse, default model	1
pragmatism	1
virtues (Aristotelian theory)	1
PAPA	1
code of ethics	1
comprehensive model	1
ethical framework	1
ethical perspectives	1
moral consideration	1
morality	1
morality (human)	1
rules (bureaucratic)	1
the virtues	1
universal model	1
values (situated)	1
capabilities (human)	1
cracking down	1
critical perspectives	1
emotions	1
end-user perspective	1
living together	1

Code (*Ethics and IT*)	**Count**
social-relational	1
contributors (open source)	1
designers	1
instructors	1
moral entrepreneurs	1
stakeholders	1
students	1
analysis	1
analysis (moral)	1
analysis (ontological)	1
anticipating	1
apply(ing)	1
argue(ments)	1
assess(ment)	1
bibliometric mapping	1
comparing	1
conceptual rethinking	1
conceptualizing	1
defend	1
elicitation	1
empirical rethinking	1
engaging	1
evaluation (moral)	1
explore	1
framework	1
justification	1
meaning	1
metaphors (moral)	1
methodological reflection	1
reply	1
resolving	1
rethinking	1
returning	1
reveal(ing)	1
revisit	1
study/studying	1
topography	1
understand(ing)	1
RoboWarfare	1
automating surveillance	1

Code (*Ethics and IT*)	**Count**
challenges (ethical)	1
character friendship	1
communicative connection	1
content moderation	1
contestability	1
corporate capabilities	1
criteria for moral agency	1
decision making (ethical)	1
decision making (moral)	1
digitalized warfare	1
dilemmas (ethical)	1
disability	1
duties (software)	1
e-inclusion	1
economics	1
ethical agency	1
ethical frontiers	1
experiements	1
explanation	1
failure to punish	1
freedom(s)	1
gameplay (ethical)	1
identity management	1
implications (persuasion processes)	1
information sharing (ethical)	1
information, knowledge, wisdom	1
issues (cultural)	1
issues (pragmatic)	1
issues/implications (privacy)	1
knowledge	1
moral appearances	1
moral identities	1
music downloading	1
obstacles	1
online communication outcomes	1
practical identities	1
practices (good)	1
privacy (informational)	1
qualities (moral)	1
regulation(s)	1

Code (*Ethics and IT*)	**Count**
relation/relationships	1
reputation	1
respect for persons	1
responsibility	1
responsibility (ethical)	1
responsibility (legal)	1
responsibility (moral)	1
responsibility (social)	1
right(s)	1
rights (intellectual property)	1
rights (robot)	1
rights (software)	1
securing privacy	1
social meaning	1
strategies/approaches	1
transparency (affect)	1
transparency (dynamic)	1
transparency (information)	1
transparency difficulties	1
transparency rights	1
use (ethical)	1
use (managing)	1
verbing micro-practices	1
virtual theft	1
voyeurism (perfect)	1
access	1
artificial intelligence (AI)	1
autonomy (personal)	1
banality	1
benefit(s)	1
change(s)	1
coercion	1
cognitive justice	1
communicate	1
conceptual muddles	1
consent (contextualized)	1
consequences	1
contextual gaps	1
contribute (cont/cost)	1
corporate/organizational citizenship	1

Code (*Ethics and IT*)	**Count**
dementia	1
development (cont/cost)	1
empowerment	1
entanglement	1
equality	1
fair(ness)	1
flourishing	1
freedom (expanded)	1
good	1
help	1
human development	1
human enhancement	1
impact (ethical)	1
implications (ethical)	1
implications (general)	1
inaccuracy	1
mainstreaming	1
moral distinction	1
moral luck	1
notice	1
opportunity	1
ownership (private)	1
personhood	1
progress	1
property	1
rational discrimination	1
reflect	1
surveillance (cont/cost)	1
sustainability (general)	1
the good life	1
transparency threats	1
vacuums (privacy)	1
value (prudential)	1
ICT programs	1
Turnitin	1
algorithms	1
autonomous systems	1
autonomy	1
bots	1
computer-patient interfaces	1

Code (*Ethics and IT*)	**Count**
data (public)	1
decision support systems	1
digital information	1
emerging/new technologies	1
expert information systems	1
extended agencies	1
health searches	1
human-computer interaction	1
iREACH	1
internet information	1
learning machine	1
lethal systems	1
multi-agent systems	1
new social media	1
online multiplayer computer games	1
profiling algorithms	1
robot minds	1
robots with biological brains	1
security (artifact)	1
simulated evil	1
software	1
software (convivial)	1
software (open source)	1
studiVZ	1
the N-reasons platform	1
the Web	1
tools	1
video game imagery	1
video games (violent)	1
virtual murder	1
virtual paedophilia/pedophilia	1
virtuous machines	1
web sites	1
Australia	1
Europe	1
all	1
citizens (senior)	1
common world	1
elderly/seniors	1
global	1

Code (*Ethics and IT*)	**Count**
humans in battle	1
humans using controlled technology in battle	1
indigenous communities	1
lab	1
non-government organizations (NGO)	1
open-source communities	1
remote	1
slaves (epistemic)	1
society	1
spheres	1
students (college)	1
the e-excluded	1
the surveillance society	1
users (older)	1
we	1
work/workplace	1

IEEE Technology and Society Magazine

Code (*IEEE Tech. & Society Mag.*)	**Count**
privacy	11
technology	7
design/development/model/creation	6
sustainability (general)	6
humanitarian engineering/development	5
challenge(s)	3
security (cont/cost)	3
Facebook	3
Internet	3
ethics	2
bridging	2
economic dimensions/realities	2
engineers without borders	2
democracy	2
engineering (the act of)	2
national security	2
regulation(s)	2
right(s)	2
trust	2
use	2
energy consumption	2
equity	2
Überveillance (cont/cost)	2
ICT(s)	2
Australia	2
India	2
Sub-Saharan Africa	2
U.S.	2
global	2
biotechnology	1
computer science	1
engineering	1
mathematics	1
engineering ethics	1
macro ethics	1
micro ethics	1
Precautionary Principle	1
design contractualism	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
etiquette	1
humanitarian ideals	1
philosophical considerations	1
social contract	1
values	1
aging	1
agreeing	1
co-exist	1
cultural dimensions/differences	1
gender	1
integration	1
linking	1
pioneer	1
political dimensions/politics	1
practicality	1
social dimensions	1
interpersonal communication	1
multitasking	1
professional	1
software work	1
Boy Scouts	1
Development Partners	1
ICT profession	1
IEEE	1
Missionaries	1
humanitarians	1
international students	1
nanotech enterprises	1
technologists	1
analogies	1
assess (performance)	1
assess(ment)	1
associating	1
calculus	1
case studies	1
current trends	1
defend	1
definition/defines/defining	1
explore	1
fiction	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
formulate	1
historical trends	1
learning	1
lessons	1
make explicit	1
mediating	1
mental models	1
modeling (social)	1
negotiating	1
participation	1
precaution	1
privacy impact assessments (PIAs)	1
reverse engineering	1
scenarios	1
simulation	1
strengthening	1
successes	1
thinking	1
understand(ing)	1
arms control	1
computing	1
contestability	1
cyber-attacks	1
data protection	1
deployment	1
disability	1
disaster management	1
disasters	1
discriminatin/proportionality	1
e-policing	1
elections	1
electronic exhibitionism	1
emergencies (national)	1
environmental policymaking	1
experiences	1
future evolution/evolution	1
governing	1
identity (affect)	1
implications (social)	1
issues/implications (privacy)	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
knowledge production	1
knowledge-sharing	1
minimizing risks	1
mitigating risk	1
pervasive/affective computing	1
planning	1
politics	1
privacy advocacy	1
privacy compliance	1
privacy management	1
privacy protection	1
relation/relationships	1
rights (human)	1
roadblocks	1
solutions (privacy)	1
surveillance (affect)	1
sustainable energy	1
voyeurism (electronic)	1
warfare	1
Überveillance (affect)	1
ICT-mediated collaborations	1
RFID-enabled authentication	1
access	1
accidents	1
addiction	1
advantages	1
affordability	1
arming	1
benefit(s)	1
benefits (social)	1
biomedical engineering education	1
business constraints	1
business opportunity	1
campus safety	1
cell-phone-enabled empowerment	1
change(s)	1
climate change	1
commercializing	1
compliance risks	1
concerns	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
concerns (ethical)	1
conflict	1
consensus	1
consequences	1
consequences (workplace)	1
death	1
depressive behavior	1
digital divide(s)	1
digital revolution	1
digital strategies	1
earnings	1
electricity-generating	1
emergency alerts	1
engineering to help (ETH)	1
entropy	1
fallout	1
good	1
harm(s)	1
higher education	1
impact (general)	1
implications (ethical)	1
innovation	1
interception	1
lethal behavior	1
low-cost	1
new industrial revolution	1
policies (energy)	1
profiling	1
scientific revolution	1
security threats	1
social e-inclusion	1
social networks	1
suicide	1
surveillance (cont/cost)	1
sustainability (environmental)	1
tracking	1
transformation	1
two cultures divide	1
volunteerism	1
vulnerabilities	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
GPS (automated)	1
Google	1
ID scanners	1
Internet (next generation)	1
Kuh-Ke-Nah Network (K-Net)	1
PIPWatch Toolbar	1
Predator	1
RFID	1
UAVs	1
USB devices	1
WiMAX	1
Wikipedia	1
Wireless Nomad	1
autonomous urban land vehicles	1
cell-phones	1
collective awareness platforms	1
communication technology	1
computer-assisted medical diagnosis	1
connections	1
cooking stove	1
cyborg	1
datacenters	1
drones	1
electrical technology	1
emerging/new technologies	1
ethical robots	1
identity (artifact)	1
identity management systems	1
intelligence (nature of)	1
keyloggers	1
lightning protection	1
location-based social networking	1
moral user	1
nanotechnology	1
networks	1
networks (collaborative)	1
networks (high-tech R and D)	1
patents	1
plagiarism-detection services	1
public information	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
reuse services	1
robotic weapons	1
robotics	1
robots	1
service contracts	1
smart grids	1
social navigation	1
social network sites/technology	1
telecommunications	1
telehealth	1
telephone	1
uninhabited systems	1
universal service	1
video communication	1
virtual institutions	1
wikis	1
21st Century	1
Aboriginal communities	1
Age (Information)	1
Age (anti-terror)	1
Age (digital)	1
Benin	1
Canada	1
China (Chinese)	1
Desert	1
France	1
Greece	1
Haiti	1
Indian women	1
Iran	1
Ireland	1
Japan	1
Mexican	1
Pan-European	1
Portugal	1
South Africa	1
Spain	1
Web 2.0 communities	1
citizens	1
civilian realm	1

Code (*IEEE Tech. & Society Mag.*)	**Count**
communities	1
corporate settings	1
developing countries/nations	1
fireworks industries	1
globalized world	1
governments	1
groups	1
immigrants	1
indigenous communities	1
international	1
millennials	1
remote	1
rural	1
students (college)	1
the world	1
urban residential environments	1
women	1
work/workplace	1

Journal of Information, Communication and Ethics in Society

Code (*JICES*)	**Count**
ICT(s)	10
ethics	5
case studies	4
cyberspace/web space/(online) environment	4
role	3
analogies	3
study/studying	3
design/development/model/creation	3
privacy	3
Internet	3
theoretical foundations	2
morality	2
gender	2
stakeholders	2
explore	2
understand(ing)	2
file sharing	2
issues (ethical)	2
judgment (moral)	2
power	2
privacy (concept of)	2
social inclusion	2
digital divide(s)	2
emancipation	2
implications (ethical)	2
open-ness	2
perception	2
policies (ICT)	2
the future	2
Facebook	2
MMORPGs	2
emerging/new technologies	2
mobile technologies/solutions	2
new media	2
social network sites/technology	2
technology	2
Egypt	2
banks	2

Code (*JICES*)	**Count**
elderly/seniors	2
information society	2
IT education	1
information systems	1
interdisciplinary research	1
privacy studies	1
Islamic ethics	1
computer ethics	1
information ethics	1
normative ethics	1
Walzerian approach	1
green theory	1
neo-Luddism	1
Right to Information Act	1
alternative research framework	1
law	1
mainstream vision	1
policies (public)	1
values (socially exclusive)	1
values (universal)	1
vision	1
age	1
aging	1
anomia	1
biculturalism	1
class	1
co-ordination	1
dual labour markets	1
factors (social)	1
fantasy	1
integration	1
interests (corporate)	1
interests (media)	1
intersectionality	1
needs	1
political dimensions/politics	1
race	1
reality	1
social dimensions	1
IT work	1

Code (*JICES*)	**Count**
non-formal business	1
temporary work	1
computing professions	1
research practice	1
technical writers (freelance)	1
analysis	1
analysis (empirical)	1
assessment (ethical)	1
bring together	1
case(s)	1
contribute (study)	1
critical systemic thinking	1
critique	1
deal with	1
develop (study)	1
diary method	1
evaluate/evaluation	1
evaluation (ethical)	1
exposition	1
focus group method	1
human environmentalist approach	1
impact analysis	1
introduce (introduction)	1
investigate	1
meaning	1
meta-methodology	1
promoting	1
question(s)	1
realisation	1
reassessing	1
resolving	1
reveal(ing)	1
structuring	1
study (quantitative)	1
"silent control"	1
ERP adoption/implementation	1
archiving the self/biography	1
attitudes	1
challenges (methodological)	1
computer security	1

Code (*JICES*)	**Count**
corporiate social responsibility	1
crashing (ruining)	1
credibility	1
dilemmas (ethical)	1
e-inclusion	1
future evolution/evolution	1
globalization	1
innovation adoption	1
internet content filtering	1
interplay	1
invisibility	1
issues (gender)	1
issues/implications (privacy)	1
mediatization	1
microblogging	1
monsters	1
moral agency	1
normative structure	1
obstacles (ethical)	1
organizational identity	1
pervasive/affective computing	1
power relations	1
regulation(s)	1
relation/relationships	1
relational maintenance	1
reporting	1
rights (individual)	1
social exclusion	1
stakeholder management	1
technophilia	1
trust (organizational)	1
use	1
abuse	1
access	1
accessibility (web)	1
awards	1
better future	1
commercializing	1
compliant/compliance	1
concerns	1

Code (*JICES*)	**Count**
corporate/organizational citizenship	1
counter-control revolution	1
development (cont/cost)	1
diffusion	1
e-commerce	1
eDependency	1
good governance	1
good intentions go bad	1
greenhouse gasses	1
help	1
higher education	1
information revolution	1
innovation	1
legitimacy	1
livelihood assets	1
merger/acquisition	1
online behavior	1
organizational justice	1
pitfall	1
protect(ing)	1
reconfiguration	1
relational memory	1
responsiblities	1
risk	1
social memory	1
social skills	1
the good life	1
vulnerabilities	1
CRM-IS	1
DNA databanks/dataveillance	1
FOSS policy	1
Knowledge Zone	1
Yoox	1
avatar creation interfaces	1
biometrics	1
blog/shop	1
community telecenter	1
computer-mediated communication	1
computing degree courses	1
cyber cafés	1

Code (*JICES*)	**Count**
dataveillance systems	1
decision support systems	1
digital film	1
electronic books/digital library	1
green IT	1
information and (its) communication	1
information technology	1
internet encounter	1
mechanisms	1
passport systems	1
software (free)	1
software (open source)	1
strategic information systems	1
virtual funeral	1
web sites (political party)	1
Age (digital)	1
Aotearoa/New Zealand	1
Curaçao	1
Europe	1
Ghana	1
India	1
Iran	1
Israel	1
South Africa	1
Sweden	1
U.S.	1
aging populace	1
computing undergraduates	1
developing contexts	1
developing countries/nations	1
football fans	1
global	1
indigenous communities	1
individuals	1
lifeworld	1
networked world	1
organizations	1
peers	1
refugee youth	1
teenagers (autistic)	1

Code (*JICES*)	**Count**
the innocent	1
the present	1
user(s)	1
value space	1
virtual communities	1
we	1